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CLEVELAND, O., FEBRUARY 25, 1892.

THE WEEK IN IRON CIRCLES.

General Features.

The money market the past week has developed some interesting possibilities, in the problem presented by the sales of our securities by European holders and the chance that the imposing balance of trade in our favor, through the Fall and Winter, may be followed by an outward movement of gold. In decided contrast, is the continued featureless state of the iron trade. The only possible stimulus to interest in the situation, is found in surmises as to the time that will elapse before a considerable number of stacks blow out, both North and South. The wonder grows, at the tenacity with which all hold on. This fact suggests the question how much of concession is to be made to the Southern furnacemen's claim, referred to in another column, that they were never better prepared to keep piling up the product, in the face of a halting demand. A good many furnaces have been holding on, undoubtedly, in the hope of the favorable reaction that has so long seemed to be just beyond. When this hope shall appear unfounded, a slow curtailment of production will come by the dropping out of a furnace here and there. Chicago reports that orders up to 100 tons are numerous, but that large sales are wanting. At Cincinnati there seems little chance of improvement, buyers providing only for their immediate needs. To a considerable extent even the small demand of the past two or three weeks has ceased at Buffalo. Advices from Detroit show that the demand for coke iron has continued fairly good during the past week, with prices unchanged, except for some particular grades which have shown a slight tendency toward further weakness, and any further reductions now seem impossible. This seems not unreasonable with gray forge iron selling at $9.25 to $9.50 at the furnaces. A fair demand for Ohio softeners has also been seen, though prices for these special irons are very well maintained. There have been no transactions in Lake Superior charcoal pig, beyond a few car load orders, these going at full market quotations. The demand for this staple seems likely to increase from now on until midsummer, many engagements have always heretofore been made for it in early Spring to be received via lake. The Louisville market has been exceedingly quiet, what sales were effected being basis $9.50 for gray forge, Birmingham, which has been the ruling figure for several weeks. Contracts for long delivery, basis $9.75 for No. 2 soft, and $10.75 for No. 1 soft, Birmingham, have been made. Consumers report a scarcity of orders which prevent their buying at the present moment, though the offerings at prevailing low prices are considered very advantageous. Only in special lines like car companies is work abundant; the prices, however, at which contracts for cars are taken necessitate practicing every economy in their manufacture, but the demand has been much greater than last year. There has been considerable iron sold by Western houses, and the demand there has been active with purchases for delivery running into the Fall on the basis of present quotations.

The Local Situation.

Unless a modification should occur, between this and the opening of navigation, between the widely differing views entertained by the vessel interests on the one hand, and the entire iron and iron ore interests on the other, there is likely to be a disagreement which may result in consequences as disastrous as they are likely to prove far-reaching. While the ore men claim to feel no uneasiness over the situation of their market, and appear to be ready enough to sell, the bulk of the wild tonnage is declining to enter into engagements as yet, giving as a reason the presence, in the Northwest, of immense stocks of grain that must be moved by lake as soon as ever the shipping season is well open. In proof of this claim one vessel owner shows offers to carry grain for sixty days at four cents a bushel. If this state should generally prevail, the natural consequence will be the driving up of the ore freights to a figure which neither the ore business nor the furnace interests will feel warranted in paying, so that the bulk of the ore sales may well be said to depend to a large extent on what agreement may be reached by the combined vessel interests. This factor will not even be affected by the disposition of a good many boats that are in the hands of the ore producers; for the experiences of the past have shown that when ore was low and freights high, the ore companies have invariably competed with the wild tonnage in the hauling of cargoes other than ore, so that, whichever way you look at it, the presence of a large quantity of grain at the head of the lakes will be a standing menace to the ore interests.

Iron Ore.

In some quarters the sales reported up to date imply a very good business, while others have hardly started, as yet, in selling their ore. The reason for this may be found in the disposition, on the part of a few Bessemer mines, of their entire product to a very few large consumers, such as the Norrie, for instance, which is practically sold up, with its entire product of eleven hundred thousand tons: but barring the sales already quoted, the non-Bessemer ore is hanging fire, partly on the ground of unsettled freights, and partly on account of the unwillingness of the furnace interests to buy in the face of a lifeless market. It may be true, as is held by some close and shrewd buyers, that the price will be lower a little later on, but this will hardly hold good as to any ore which has found any considerable sale, for the reason that the producers would rather sell half their output at a profit, than sell it all and get out even, as the rebate to which early buyers would be entitled would lead to. The ore men, too, say they are not over-anxious to force a market at this time, although every day some one is letting go of his output. As a whole, it looks very much as though the beggarly condition of the market had frightened everybody, and the anticipated improvement in all the lines seems to have resolved itself into a bull freight market, with everything else as low as ever

Pig Iron.

The furnacemen who, during the brief advance of last November, were encouraged to look for a better market, more especially in view of the very large sales made in the way of railway supplies, have even stopped complaining, and are simply working along because they can still less afford to remain idle. They have their ore to pay for, some of them, and they must make and sell iron, at a loss, if in no other way, because such a course is cheaper than to stop. In some instances the fixed charges will not permit banking, in some there is a fear of losing trade, and so the consumer gets what iron he wants at his own figure. It is not too much to say that any one can buy an almost unlimited quantity of good pig iron at a dollar a ton less than it cost to make it. To be sure, this result has the effect of shutting out all Southern competition, but the situation is very serious, and may prove disastrous for the smaller and weaker concerns, who are not prepared for so long a siege of poor trade and unprofitable prices.

Merchant Iron.

The same depressed feeling manifested in other lines is the ruling spirit in all the products of manufactured iron. The demand is poor, and what little stuff finds a market goes at any price. At the ruling quotations, bar iron is a gift, and other things are no better off. Only a week ago a lot of bar iron was sold at a valley mill at a figure approximating $28.60, half extra. At this rate, the price of iron is cheaper in proportion to the amount of additional labor put upon it; the more expensive to make, the lower the price.

DECAY OF THE SCOTCH PIG IRON TRADE AND THE CAUSE.

An instructive lesson to American iron makers is afforded in the history of the Scotch pig iron trade. For more than 200 years the Scotch iron industry has had an existence. Thirty years ago nearly one-third of the pig iron make of Great Britain was produced in Scotland. For years Scotch pig iron virtually controlled American markets in the matter of softeners, enormous prices being paid for the foreign article. Now note the present status of this once great industry as shown by the statistics for 1891: In 1880, the decline of the Scotch iron trade began to show itself in diminished production, which has steadily dropped until, in 1891, the Scotch furnaces produced only one-eleventh of the entire make of Great Britain. From one-third in 1860, to one-seventh in 1880, to one-eighth in 1889, to one-eleventh in 1891—a heavy drop, indeed! Turning to the once great customer of the Scotch iron masters, the United States, we find that, in 1890, our imports had decreased to 14,000 tons, while in 1891 they dropped to a paltry 7,000 tons, our Ohio softeners having quite displaced the foreign article. To complete this picture of decay, the *Iron and Steel Trades Journal*, of London, notes these two significant facts in connection with the Scotch iron trade:

At the beginning of 1891 the blast furnaces of Scotland were, with some half-dozen exceptions, black and silent on account of a dispute between the iron masters and their men. At the beginning of 1892 the public stock of pig iron in Scotland—that, namely, which is represented by Connal's warrants—was practically all in the hands of a syndicate of English speculators, with the result that the "open market," which has always been the life of the trade, is destroyed.

Not only this, but the English makers have been fighting the Scotch furnacemen on their own ground. From exhaustive figures it is shown that all at once the Scotch consumption of Scotch iron has dropped from 766,000 to 394,000; the exports and rail deliveries have dropped from 454,000 to 313,000; and the imports of English pigs have bounded up from 435,000 to 700,000 tons.

But the most significant fact of all is that stated by the London paper in the foregoing extract, namely, that the warrant system is directly responsible for the summary destruction of the "open market," which has always been the life of trade. When the time comes for erecting a tombstone over the grave of the once mighty Scotch iron industry, the most conspicuous inscription should be: "Strangled by Speculators." The moral to American furnacemen is obvious.

COMPRESSED AIR AS A COMING POWER.

Attention is just now being drawn in this country to compressed air as a substitute for steam, and the interests pushing it to the fore are active and enthusiastic. At Philadelphia, the Pneumatic Power Company has asked councils for permission to lay pipes in a number of streets, to supply power in this form, and the Philadelphia Rapid Transit Company has been organized in the same city to apply compressed air to the operation of street cars. In Paris and Birmingham large plants have been in operation, which have demonstrated that compressed air is economical and convenient and that for driving ordinary rotative steam engines, steam hammers, pile drivers and other direct-acting engines, domestic motors, elevators, ventilating or exhausting, supplying air to furnaces, improving draught of chimneys, refrigerating by expansion of compressed air after performance of work, elevation and transport of grain, etc., it is peculiarly serviceable, dispensing with boilers, ash-pits and coal stoves or, in new works, saving the cost of boilers, flues, chimneys, etc.

At Toledo, street cars have been operated by the new power. Eight cylindrical reservoirs, containing 90 cubic feet of air each, and charged to 600 pounds, are put under the car. There are two engines with cylinders of five-inch diameter, which drive directly on the wheels of one axle, or may be connected to drive all four wheels. At 50 pounds pressure a speed of eight miles an hour is obtained, and the cars can be run eight or nine miles without recharging.

With electricity and compressed air crowding into the field, the next decade promises large inroads on the domain in which steam has so long been an undisputed monarch.

THE SOUTHERN PIG IRON SITUATION.

It has been quite the custom of late to impute financial weakness to Southern furnaces, and to predict that the present heavy production in that quarter will soon be attended with serious results. A source in which we have been in the habit of reposing trust for conservative statement is our authority, however, for a strongly contradictory assertion. Says our correspondent, on this subject:

An extended trip through the region ending this [last] week, reveals some facts not generally credited among Northern producers. The larger companies, instead of reducing their output, are running every stack to its full capacity, and have no thought of shutting down, unless it be an occasional furnace temporarily for repairs. By improved methods, economical management, better furnace practice and steady improvement in the coke, the cost of iron has been steadily reduced while quality has been steadily improved. For these reasons, furnaces that two years ago would have lost heavily on a market like the present, are now holding their own or actually gaining. Nearly every important iron company in Alabama, has, during the last year, largely reduced outstanding indebtedness from current earnings. Those concerns with heavy bonded indebtedness are, for the most part, able to make their fixed expenses from profits on coal and coke, leaving pig iron free from the burden of interest. These points are quite at variance with statements recently made by writers in Northern journals usually well informed. They are facts, however, and Northern producers, who expect to crush out Southern competition because of weakness in that quarter, are calculating without due knowledge of the facts. One or two weak spots in the South have developed and been considerably talked about. These, however, are exceptional in their location management and in other respects. Their outcome has no logical bearing upon the main argument of producing cheap iron in the Birmingham district.

These statements will be read with decided interest by Northern furnacemen, and will no doubt be variously discounted or explained by those most directly interested. We give them as they are given us, as an interesting phase of the anomalous situation in the iron world.

A NEW THING IN STEEL-MAKING.

Letters-patent were recently issued (January 12, 1892) in the United States for a new process of manufacturing steel, the inventor being a resident of Great Britain. Stripped of verbiage, the process may be described as follows: When using an open-hearth furnace in connection with the basic process the inventor begins by increasing the carbonization of the metal in the bath to any required degree. He charges, in the first instance, a suitable quantity of carbonaceous material, such as coal, coke, graphite, charcoal or other similar substance, and then charges scrap or pig iron and scrap on the top of it. As the metal melts it takes up a considerable percentage of carbon, and although in the basic process much of the carbon is eliminated with the phosphorus, enough remains to enable the charge to be finished by boiling down with ore in a similar manner to the boiling down of an ordinary charge of pig in a silicious-lined furnace. In this way a steel can be produced having any desired percentage of carbon within certain limits. Hitherto one of the greatest defects of the basic process has been that considerable difficulty and uncertainty are experienced in making steel with more than about 15 per cent. carbon.

By the present process, the bath itself is first saturated with carbon, so that when the phosphorus has been eliminated there will still remain a percentage of carbon in excess of what is required at the finish; and afterward this excess is removed in the ordinary manner by boiling down with ore, so that when the furnace is tapped the metal shall contain exactly the percentage of carbon desired.

It has generally been believed that phosphorus will not leave the metal in the presence of carbon. The inventor finds in practice that this idea is erroneous, and that, although a large proportion of carbon is eliminated with the phosphorus, still that when there is an excess of carbon sufficient remains to obtain steel with much higher percentage of carbon than has hitherto been found to be practicable with the basic process.

The inventor is Henry C. S. Dyer, Westhope, England.

FINANCIAL DANGERS.

The money question is the burning theme at Washington just now, and the free silver men in the House seem in a fair way to win in the preliminary struggle. The Mexican condition, that is the direct result of the very plan the Blandites would force upon the United States, ought to call a halt on inflationist schemes. Mexico is a bi-metallic country, in name, but her free coinage policy has worked out into a practical silver monometalism. The silver mine men have allied with them in the present campaign at Washington, the representatives of the idea that in some inscrutable way a larger issue of money will put some of it in the pockets of people who now find great difficulty in getting hold of it. No matter what the issue of currency is, it is well to bear in mind in this connection that with a large per capita allowance, the lean purse will fatten in the old fashioned way and no other—there must be an equivalent in labor or other thing of value, for every dollar that comes in. Let the government put out 50 millions of new money to-morrow and a large part of it would soon be included in the bank statements of reserve excess.

There is in the money question, as in the tariff, a witchery that the congressional tinkerers seem unable to resist. This everlasting agitation in both these lines of legislation, does almost as much harm to the vested interests of the country as would be wrought by the carrying out of some of the vicious schemes that are pushed with such zeal at every session of Congress. The well-known position of

President Harrison insures the defeat of a free coinage bill this time, at least, even though the silver mine influence should prevail in the Senate.

BRITISH confessions come thicker to the effect that Free Trade isn't always the best thing even for a contracted, insular country that must break into the markets of the world because its own are limited. Eminent statistical authorities from whom United States Consul Metcalf, at Newcastle-on-Tyne quotes, dwell on the probability that the United States will yet come to be a shipbuilding competitor of Great Britain. "To meet this competition that seems to be coming," one authority says, "the ship owners will need cheaper working." Another anxious look at growing competition on other shores is reflected in the London *Iron and Steel Trades Journal's* recent comments on the influx of cheap steel shapes of Belgian manufacturers.

THE disposition of the trade everywhere to be Davy-Crockett sure it is right, is one of the best indications that the ascending grade, when it is reached, will be climbed with a steady, certain step, and that there will be no slipping back into the slough.

THE bill in Congress, requiring an affirmative vote of the directors before any loan is made to an officer of a national bank, and calling for reports to the Controller of the Currency of loans to officers, as they are made, would provide just such a brake as experience proves to be necessary.

HARD LINES FOR CHARCOAL IRON.

Recently the Detroit *News* published the item concerning the charcoal furnace at Newberry here reproduced:

"The Newberry furnace still continues to do good work. The output will average fully 65 tons per day. It is considered the best paying plant of the kind in the State at the present day. The efficient management of C. W. Case has a good deal to do with its success."

Noting and commenting on which, the Newberry *News* says, evidently speaking "by the card":

"Concerning the above Manager Case spoke the other day as follows: The article is misleading, as it conveys the impression that our business is making large profits. If to be losing the least makes a furnace the 'best paying,' etc., then the distinction belongs, perhaps, to one of the four furnaces in Marquette county, now out of blast. They are notable instances of the fact that during this period of extreme depression some furnaces pay best when shut down.

"The Newberry furnace is doing good work, and, moreover, is favorably located, probably more so than the majority of Michigan and Wisconsin plants, and, barring unforeseen difficulties and conditions, can undoubtedly continue in operation; but to make good profits we must have, what we do not now possess, a market that affords a fair price for iron. The last sales made last season were at the lowest figures known to the trade. No improvement whatever is seen up to date, and reasonable prospects are lacking. Production more than keeps pace with consumption, and the so-called Western charcoal furnaces had about 196,000 tons of iron in stock January 1st, which is over 50,000 tons more than on any previous January 1st, and more than ever before in the history of the business. The charcoal iron industry of the North is passing through a crucial period, the outcome of which is problematical, and is viewed with decided apprehension by many of the best posted."

Mr. Case is in a position to speak advisedly about the difficulties confronting the charcoal iron interest, and what he asserts is borne out by the experience of every charcoal furnace in this region during the past few years. The trouble does not consist in the inability of furnaces here to make iron at as low a price as competing furnaces in other parts of the country so much as in the difficulty of disposing of it after it is made. Improved methods in the manufacture of coke iron has operated to greatly restrict the demand for charcoal iron, the better grades of coke iron now taking the place of charcoal iron for many purposes, and this, we think, is the principal reason for the trouble that the furnaces now in operation have to meet in the effort to dispose of their output.—[Marquette (Mich.) Mining Journal.

Big Steel Trusses for the Manufactures Building at Chicago.

The contractors who are putting up the big steel trusses for the roof of the Manufactures building are getting ready for the biggest "barn-raising" in history. There are 27 main trusses, with a span of 380 feet and a height of 211 feet. They are 14 feet wide at the floor and ten at the apex. These trusses with the eight smaller gable trusses weigh 10,800,000 pounds. The main trusses weigh about 350,000 pounds each, and they are to be raised in position from the floor. To handle these great iron structures a "traveler" is being constructed on the floor of the building, 50 feet by 260 feet and 120 feet high. On top of this "traveler" will be raised a central tower 135 feet high, so that the total height of this great lifting arrangement is 255 feet. It will weigh 720,000 pounds, and over half a million feet of lumber will be used in its construction. The floor of the building will not, of course, bear this great weight and the "traveler" will move on a track specially prepared for it. As much as is necessary of the floor will be torn up and three rows of piles will be driven to support the "traveler." When the work of raising the trusses is finished, this piling will be sawed off and the floor relaid. Another big "traveler" is being rigged on the floor of machinery hall to erect the iron work in that structure—a task scarcely less difficult.

THE TINPLATE MAKERS TO THE CANNED GOODS MEN.

Clarence R. Britton, acting secretary of the Tinned Plate Manufacturers' Association of the United States, made a statement to the Western Packers' Canned Goods Association, at its recent Chicago meeting, showing the progress made in the making of tinplate in this country. Mr. Britton's audience was, of course, not thoroughly *en rapport*, but it is safe to say that some of his statements were in the nature of eye-openers. "If it be necessary," said he, "to apologize for the small production of American tinplates, there are many good reasons why the industry is not further advanced; one because of the immense supply in this market when the new duty went into effect; another, and a very just one, was referred to by Mr. Norton in his address last year, and that is the present crude and laborious processes of manufacture. Those who have studied this subject do not believe for a moment that manufacturers in this country will continue for a very long time to use or even adopt the Welsh methods. There have been improvements made right here in Chicago which, though not quite perfected in every detail, are so nearly so that we are sure they will prove successful, for they are in the hands of men of mechanical genius and capital, who will not allow them to fail."

These good points appear further on the address: "The American manufacturers have started by trying to make the best grades of plates; first, because there is a chance for a little profit, but mainly because they know that every teakettle, every tin cup, and every tin roof made from American plates will be watched with an eagle eye for years to come, and the material must be of such a quality to stand this severe test. There are now in successful operation 12 different tinplate works, varying in size from the one 7x9 feet, which Governor Campbell's lieutenant claimed he found at Apollo, to those at Demmler and St. Louis covering from four to six acres. There are 13 others in course of erection, some nearly completed, and all of which will be in full operation by midsummer. These 25 works will contain 55 mills, with a capacity of about 35,000 boxes per week, or between 60,000 and 70,000 tons per year, which is about one-sixth of the present consumption. The 25 works when completed will represent an investment of between $3,000,000 and $4,000,000. If this be done in one year's time, what may be expected in three or five?"

How to Make the 100-Mile Flyer Safer than a Horse Car.

Chas. R. Deacon's "One Hundred Miles an Hour" in the March *Lippincott's* has this interesting paragraph about fast flyers:

"The prevailing ideas regarding railway speeds are very erroneous at any rate. The majority of people, even the most intelligent among these who habitually travel, obtain their conceptions of speed from the figures of the time table, forgetting that in nearly every instance considerable portions of the route must be traversed at much less than the average rate required to cover the total distance in the schedule time. There are very few, if any, of the fast express trains which do not on some part of each 'run' reach or exceed a speed of a mile a minute. Yet, by reason of superior railway and well-constructed cars, the accelerated velocity is unnoticed; while running at from 60 to 70 miles an hour the passenger calmly peruses his newspaper or book, children play in the aisle, and a glass brimful of water may be carried from one end to the other of the smoothly-rolling coach without the spilling of a drop.

"Would faster trains be dangerous? No. In the history of railroads no instance can be found where a train has been derailed by reason of running at a high rate of speed. There is no more danger, intrinsically, at 100 miles an hour than at 40. The dangers to be guarded against bear little or no relation to the question of speed. The strict supervision of the tracks and bridges, the abolishment of crossings at grade, the fencing in of all lines of railway and the prevention of trespassing thereon—safeguards for the guidance and protection of trains—these requirements met, the 100-miles-an-hour 'flyer' will be a safer conveyance than a city horse car."

Popularizing Air as a Carrier.

Owing to the increase in the number of air brakes used most railway shops find it necessary to have their plants supplied with air pumps, with pipes leading to all important parts of the shops to be used in testing. Another way in which this air pressure can be used to great advantage is in the sending of small, light articles from point to point. The transfer of mail and messages from one office to another, particularly when they are located in the different stories of a building, is often a great cause of annoyance. The average messenger boy is not a very reliable person and is often not at hand when his services are desired the most, which fact sometimes causes a delay in the delivery of important messages. It is probably questionable whether it would pay to establish an expensive system for this purpose, but there are great many places about large plants where a short and straight line could be established. A very successful and convenient arrangement of this kind has been put in operation in at least one of our large railway shops. The tubes are of heavy, galvanized iron made by an ordinary tin smith, and consequently the expense is not great. The carrier is made of the same material, with a piece of leather fastened on one end forming a packing, and in the other end is driven a wooden plug to act as a guide and receive the shocks caused by the stopping of the carrier at the end of its journey. A very small amount of air is consumed in the transfer of a message, and instead of waiting for a messenger boy the messages can be delivered in a few seconds from either end of the line at any time. Two or three such tubes as this in a large plant might easily save the expense and annoyance of a messenger boy and prove a great convenience.—[Railway Review.

THE total amount paid out up to February 1st, by Treasurer Seeberger, for the construction and other expenses of the Chicago Exposition, was $3,572,891.

MINING ENGINEERS.

BALTIMORE MEETING OF THE AMERICAN INSTITUTE.

Delightful Hours of Relaxation, in the Intervals of Technical Discussion—A Modern Steel Plant.

[SPECIAL CORRESPONDENCE IRON TRADE REVIEW.]

Just what memories will come back to those members of the Institute who 13 years ago attended a meeting of the mining engineers at this same location, none but themselves will ever know; to those of us who did not attend that famous meeting there has ever since been a longing to know more of the proceedings than appear in the published transactions. It has been noticeable at the meetings since held, in various parts of the country, that when two or more members gathered in a corner and talked low and earnestly about the Baltimore meeting of '79 there was sure to come a burst of wild applause which sent all away holding their sides, as they gave vent to irresistible mirth, and to any inquiry as to what was the cause of so much hilarity the answer ever was, "Oh! you should have been there."

Having attended the meeting of 1892 just closed, I can only say of this Baltimore meeting, it certainly was well to be there. The large local committee of the citizens of Baltimore, which had at its head James W. Tyson as Chairman, and J. Harry Lee, Secretary, mindful, possibly, of what had been done, or left undone at the meeting of 13 years ago, aided by the efficient and active members of the various committees having in charge the detail of reception and entertainment of the society, so well performed the duties assigned them that no member present at this meeting will ever cease to remember with much pleasure that he was at Baltimore at the meeting of '92.

The meetings were held in the lecture room of the Department of Mineralogy, Johns Hopkins University, and were ably presided over by the President, Mr. John Birkenbine, of Philadelphia. The papers were, as usual, in the main descriptive of various locations of mining operations, with photographic views of the mines, in which the methods of operating them, and the value of the newer mechanical devices for hoisting, transferring, loading and unloading materials, by the use of machinery especially devised for the purpose, were well exemplified.

Engineers from the North and West were somewhat surprised at the interest evoked by the papers and discussions on the geological origin of the phosphates of lime, the extent of their deposition in the South, and the appliances for mining and preparing them for the market. Why this was so was made plain a day or two later when an excursion train took the members across the country to the ancient city of Annapolis; for, in looking over the harvest fields of the old time planter, one was reminded of the value of phosphates or anything else that could bring back to verdure and usefulness the desolate and deserted fields which stretch far away on either hand.

A citizen of a city somewhat famous for its numerous churches was once dilating with much local pride on the unusual facilities they possessed by which men could be led into better ways of living. His friend listened with evident interest, but ended the matter by saying, "I am glad of it; you need them." And so it may be said of phosphates and all the various kinds of fertilizers for which Baltimore and the South are somewhatfamous. They "need them." The discussion of this subject brought out many new and interesting facts not previously known to many members present, and instances showing the value of their use were given, that seemed indisputable. Yet a statement made by a member that the efficiency of his phosphates, made out of theslags of his steel making process, was such that a liberal application of it would make *anything grow anywhere*, and that as a test, it had been placed about the roots of a dead tree and had brought it back to life and verdure, was by many doubted; in part, for the reason that the speaker was himself a distressingly bald-headed man.

It is not the purpose of this article to go into a recital of the papers presented, or of the discussions had, for are they not all written in the chronicles of Raymond, the scribe, and spread all over the earth, or at least wherever the postoffice or an express company can reach a mining engineer who has paid up his dues? But the mining engineers, their wives and best girls did make a visit to the old and honorable capital of Maryland. The day was perfect; overhead through a cloudless sky the warm rays of what seemed an early Spring-day sun shone in brightness that was in striking contrast with the fields of snow, and the chill Northern winds through which many had but just passed. The first objective point was the Naval Academy where, under the guidance of Capt. Phythian, the superintendent, and Lieutenants C. A. Gore, C. D. Galloway and G. A. Merriam, the various buildings and quarters, the training and prison ships, the boathouse and gymnasium, were inspected in detail, and where the universal neatness and cleanliness everywhere were apparent and commented upon by all the visitors. As the party walked through the grounds and museums everything they saw served to remind them of the old time Navy. Sheltered in nooks, here and there, reposing on pedestals in solemn and stately glory, were massive figureheads, once the ornament and pride of old and forgotten battle ships. Models of the old time three-deckers with masts and spars trimmed out in all the tracery of standing and running rigging, were there, by the study of which the dead heroes of long ago who fought and won naval battles in the old-fashioned way, had, as young cadets or middies, been taught to handle the ropes as they sailed the seas over. There was something just akin to sadness in the thought that the progress of engineering as applied to naval warfare had of late years swept all these into oblivion. Never again will such ships drift over the Summer seas, or float with gentle winds into the ports of far-away nations. No longer will such yard-arms be manned with the old time tars in dress parade; no longer from the holy-stoned deck to mizzen top will the swelling white canvass reach out its spreading wings to catch the favoring breeze; no longer beneath the moonlight skies of the Mediterranean, or the seas of the Orient, will gallant youths and happy maidens, to the music of the band, tread on such decks in graceful measures the courtly dances of our grandmothers; and no wonder was it that the old man-of-wars-man, whose task it now is to guard these ancient relics, spoke derisively of the new-fashioned ironclads that now had ursurped their place, and whose engine-driven hulls, and power-moving mechanism had sent Jack tars ashore with all spars, sails, ropes and top-hampers.

In harmony with the rest, was a visit to the Capitol building, into the Senate chambers of which the engineers swarmed to gaze upon the scene now pictured on its walls, of the retirement of Washington from public life. 'Tis said the room is now, with slight exceptions, as it was on that memorable day when, speechless with the solemnity of the occasion and filled with memories of the past, the Father of his country could find no words with which he could express what his heart so fully felt; and when the result might have been awkward indeed had not a member, with a kind perception of the embarrassment, stepped forward, saying: "General, your patriotism and greatness are only equaled by your modesty."

But for the incident of a person plucking the sleeve of a member, and inquiring as to who the delegation were, and who, on being told we were engineers, asked in a low but earnest tone if we wanted any legislation, we might, in view of our surroundings, have readily drifted backward into the misty past, but the thriftiness of the alert member of the third house, pulled us back to to-day. It was an odd and, for the time, an agreeable sensation to be so swiftly swept out of the current of the pressing throng of city life, where the hours and days are all too short for the pressing matters in hand, into such a peaceful nook as this restful capital, sunning itself on the banks of the Severn; where, for whatever is to be done, to-morrow is as good as to-day, and next week far better. At the executive mansion, to which we were invited, a most hearty and generous welcome was extended us by Governor Brown and his charming wife. With the whole house opened for our use, and a well spread lunch table at our disposal, there was nothing left to be wished for; and in the remembrance of the visit there will come to all who were there a most pleasant reminder of Southern hospitality. On the return of the party to Baltimore, the usual society banquet was held at the Hotel Rennert, at which time the presence of Mayor Latrobe and quite a number of the citizens of Baltimore and their wives, lent an added charm to the occasion.

The following day, while not as clear and as pleasant as was the previous one, was still an enjoyable one, for it was spent in viewing the new and modern steel plant of the Maryland Steel Co., located on the north shore of the Patapsco river, about nine miles below Baltimore. No sketch could do justice to the works as they now are, or explain in full what they will be when fully completed. Suffice to say, that on every side are evidences that an abundant use of money, coupled with an intelligent perception of what is required to construct a plant embracing the newest discoveries in methods for transforming crude ores into steel steamships and rails, has worked a wonderful transformation at Sparrow's Point; and it was the wish of all who enjoyed the attention and courtesies of the officers of the company that both the company and their able managers should in due time reap their reward. Soon after the return of the party to Baltimore the threatening skies let loose their surcharged vapors, and there was a hurrying to and fro to catch outgoing steamers and trains, and amid the hasty farewells there was ever present the expressed sentiment, "Well, we have had a good time at the Baltimore meeting."

NEW YORK, Feb. 23, 1892. J. F. H.

IMPORTANT IRON INTERESTS DISCUSSED,

Including the "Control of Silicon in Pig Iron" and the "Preservation of Hearth and Bosh Walls."

The five-days meeting of the American Institute of Mining Engineers, brought out a number of interesting and valuable papers. The sessions were held at Johns Hopkins University, and a cordial welcome was extended by President Gilman and by Mayor Latrobe, President John Birkinbine, of the Institute, responding.

Geo. F. Kunz read the first paper, describing his recent trip through Russia, dwelling on the gem mining of the Urals. Henry M. Howe followed with a short paper on copper mining in Vermont. The lenses of copper ore in that State, he said, were traced to very considerable depths, some as great as 1,800 feet. Many promised still greater depths and seemed to be of the same origin as the strains of copper found in Norway. In many parts of the copper deposits of Vermont and Canada layers of gossan and undecomposed sulphides superseded the copper strains.

In his paper on the "Magnetic Iron Ores of Ashe County, N. C.," H. B. C. Nitze described the deposits found in the area of crystalline rocks, consisting chiefly of gneiss, hornblende-schists and micaceous schists. These are practically undeveloped. Fifty years ago there were a number of Catalan forges in the country, which smelted a very tough iron. At present mining is being conducted but in a small way. The territory spoken of embraces about 150 square miles and the magnetities, which are chiefly found, are chemically suitable for the manufacture of Bessemer pig-iron. Brown hematites and red specular ores are also found, but not plentifully. Silica, metallic iron, sulphur and phosphorus in slightly different proportions have been found in various parts of the belt. The titaniferous belt, starting in the northern part of the country, is of great scientific interest. The ore is compact, magnetic, free from gangue and has a bright silvery lustre. An analysis shows it to contain a large proportion of metallic iron and smaller proportions of titanic acid, silica and phosphorus. Nearly all these ore deposits would be accessible to a railroad built up the north fork of the New river. Mr. Nitze pointed out on a series of maps the exact location of the leads referred to.

In the discussion following, Dr. R. W. Raymond suggested that the boundaries of the titanic ores ought to be determined, for the protection of iron workers. The Durham furnace, he said, had been paying a rental for 20 years on a magnificient body of iron ore which was absolutely useless to it on

account of its high percentage of titanic acid, although it was extremely low in phosphorus. The titanic acid ran as high as 14 per cent. It was well-known to metallurgists, he said, that titaniferous ores could be treated in the blast furnace by carrying large quantities of alumina in the slag; but at Durham, where they relied upon the Trenton dolomite as a flux, the alumina was not obtainable.

Mr. W. H. Hoffman, of Brewster, N. Y., read a paper upon "Granulating Magnetic Iron Ores with the Sturtevant Mill, at Croton Magnetic Iron Mines, N. Y.," in which he gave a thorough account of the mill machinery, and the method of procedure in its use. Dr. Raymond said that at the next meeting he hoped to have papers on various machines for crushing.

"The Great Gossan Lead of Virginia," was the title of a paper by Edgar C. Moxham, that excited free discussion.

Wednesday afternoon's session was given up to papers on the various phosphate deposits in this country. The evening session had two important papers; the first, on "The Preservation of the Hearth and Bosh Walls of the Blast Furnace," by James Gayley, Manager of the Edgar Thomson furnaces, at Braddock, Pa.; the other on "The Control of Silicon in Pig Iron," by Wm. H. Morris, of Pottstown, Pa. Mr. Gayley's paper was full of valuable information as to the progress made in bosh protection, since the development of cooling devices. It is now possible, said the essayist, to protect the bosh so well as to make it the most durable part of the furnace. Although the first cost of bronze plates is somewhat greater than that of iron ones, the difference is covered many times over by increased economy. Before the introduction of bronze plates the usual experience as to fuel consumption was a minimum quantity at the commencement of the blast, gradually increasing until at the end it was abnormally high. On the other hand, it has been a common experience, where the walls were equipped with bronze cooling plates, that the fuel consumption at the end of the blast was very little in excess of that at the early part. There is much difference of opinion with regard to the height above the tuyeres at which bosh-plates can be used to advantage. They have not been placed above 12 feet at the Edgar Thomson furnaces, but they have been used higher at other works with good results. Besides the use of cooling plates for the preservation of the bosh, the bricks themselves are a matter of equal importance. In recent years there have been changes in design and method of construction, but very little in the brick material. This, Mr Gayley thinks, is proper enough, as the fire-clay bricks now available are about as good as can be made. Moreover, very little depends on the durability of the brick. Simultaneously with the commencement of the smelting operation there is deposited a coating of carbonaceous material on the walls, which, as the process advances, replaces the brick to the depth of several inches; and investigations have shown that this substitution is best promoted through the medium of a basic cinder. On blowing out a furnace it is invariably the case that the walls are found protected with a carbon coating, and it would appear that this carbon substitution is done very thoroughly at an early period in the blast. The speaker had obtained good results from the use of carbon bricks, which had proved serviceable in the hearth, but chiefly valuable for their use in the bosh, contributing to the regular working of the furnace to the attainment of low fuel economy.

Mr. Morris stated in his paper on the "Control of Silicon in Pig Iron," that such control means good management of the furnace, especially where close results are required on sulphur as well. If the furnace works slowly or has a stoppage it means more silicon in the pig. In the discussion of the paper, it was stated that the quantity of silicon in the pig depended more upon the proper admixture of ores than good furnace management. G. F. Knapp, of Steelton, Pa., declared that at the Steelton works the matter was under positive control, and that without change of charge, fuel, heat, quantity or pressure of blast they could change in 24 hours from .25 per cent. of Si to to 2.5 per cent. of Si. Mr. Pechin said that in Virginia similar results were obtained working on identical ores and mixtures.

Among papers read by title only were the following: "High-pressure Hydraulic Presses in Iron Works," by R. M. Dealen; "Notes on the Selection of Iron Ores, Limestones and Fuels for the Blast Furnace," by Fred W. Gordon; "Tests and Requirements of Structural Wrought Iron and Steel," by Gustavus C. Henning; "A New Method for Removing Scales from Direct Metal Ladles," by David Baker; "The Rock Drill Applied to the Opening of Blast Furnace Holes," by David Baker; "Extraction of Ore from Wide Vein or Masses," by C. D. Delprat.

President Birkinbine was re-elected for another year. Thomas M. Brown, Boston; David T. Day, Washington, and John Stanton, New York, were chosen Vice-presidents, and the following were made board of managers: H. L. Hollis, Chicago; George W. Geortz, Milwaukee, and Charles Kirchoff, New York. Dr. R. W. Raymond was re-elected to the Secretaryship. Theo. D. Rand was likewise continued in the office he has held for so many years.

The Economy of Compound Engines.

Mr. Cooke, in his paper in the *English Illustrated Magazine*, calculates that the London & Northwestern engines collectively consume 3,095 tons of coal per day. Seeing that compound engines have been proved in actual working to consume about six pounds of coal per mile less than other engines on the same work, and that they are daily taking loads without assistance which any other type of engine would require two engines to work, it is evident that their adoption has been of material advantage to the company.

THE main World's Fair buildings, exclusive of what will be necessary for their roofs and for their interior finishing, require 250,000 panes of glass and about 250 tons of paint. An expenditure of almost $500,000 is necessary for these items. The great Manufactures Building requires 50 tons of paint and 30,000 panes of glass of 26 different sizes, the average size being 27x44 inches. In the Transportation Building will be 112 circular sashes, 12 feet in diameter, each containing 37 lights; and 68 semicircular sashes, 22 feet in diameter, having 60 lights each.

LAKE SUPERIOR MINING NOTES.

The Crystal Falls *Diamond Drill* says that the Menominee Range expects to see a fairly good business year, notwithstanding the calmity that has befallen the Ludington and Hamilton mines, at Iron Mountain. Water in the Ludington is rising at the rate of about a foot an hour and is now above the sixth level. It adds that the Ludington people have decided to let the mine remain idle and that 150 more men have been discharged. The Ludington cannot be expected to resume mining in less than a year. The Chapin force will no doubt be considerably increased in the Spring and a full working force will be employed at the Millie.

Owners of the lease of the Hollister mine have decided to change the name to the Cundy Iron Mining Co., in honor of their mining captain. The mine is fast assuming shape to begin active operations.—[Diamond Drill. Crystall Falls.

Contracts have been signed for building the big ore docks of the Duluth, Mesaba & Northern road. The West Duluth village council has given the road the right to use Fond du Lac avenue from the St. Paul & Duluth road to the dock front, and a site 900 feet and 1,000 feet long in the city itself has been offered for $5,000. On one of these the ore docks and terminals will be placed. The docks will be the highest in the world, the floor being 54 feet above water, or 2½ feet higher than the docks of the Duluth & Iron Range, at Two Harbors, which are now the highest known. The new docks will require about 3,500,000 feet of timber, will have a shipping capacity of 1,000,000 tons a year and will cost $200,000.—[L'Anse (Mich.) Sentinel.

The mining property and machinery of the Ruby Iron Mining Co. was seized by the Keeweenaw Association, Limited, upon a judgment found in their favor before the Circuit Court Commissioner. The invoice showed the value of the plant to be about $15,000.—[Gogebic Iron Spirit, Bessemer, Mich.

The Charleston Iron Co. has filed its articles of incorporation. The capital stock is $2,000,000, and the incorporators are John McKinley, of Duluth; Frank Cox and E. A. Humphreys, of Charleston, W. Va. The property controlled is lots 1 and 2, section 4, 58-18 and the east half of the southeast of section 33, 59-18, all of which adjoins the Mountain Iron mine on the west, and has heretofore been known as the Buckley claim.—[Vermilion Iron Journal.

The Union Mining Co., composed of St. Paul and Ashland men, has discontinued work on all its options on the west end of the range in Wisconsin, says the *Inter-State News Record*, of Ironwood, Mich. The latest of its holdings to be closed down is the Sampson in the Upson district.

C. E. Shannon, the Duluth iron man, was in town Tuesday and visited the Sheridan explorations in 62-14. A Sullivan diamond drill, leased of the Minnesota Iron Co., was started at the Sheridan to-day. It has been placed just west of the shaft and will bore nearly vertical, in order to ascertain the depth of the vein in which the shaft is bottomed. Later it will be removed further south and bore northerly to ascertain the width of the vein.—[Vermilion Iron Journal.

The St. Paul Iron Co. is being organized with a capital stock of $2,000.000. It hold twelve 40's in 58-17. The incorporators are E. C. Gridley, J. T. Hale, E. G. Chapman, S. R. Payne, H. S. Stearns and J. P. Morrow.

Chicago Pushing for a Technological Institute.

The movement in Chicago for the establishment of a technological institution, with physical laboratory and museum of mechanical arts, was given added impetus by way of sentiment-making, at the February meeting of the Chicago Electric Club. Hon. Francis W. Parker delivered the address of the evening and there was a discussion by well-known Chicagoans, including President Sunny, of the Electric Club, Ex-Mayor Roche, Director Revell, of the Columbian Exposition, Rev. Dr. P. S. Henson and Dr. Wm. R. Harper, President of the University of Chicago. Mr. Parker made these, among other points, as to Chicago's need of men trained in special engineering lines:

"In the address of the President of the American Society of Engineers, at Chattanooga, on the 22d of May, 1891, every one of the great engineering works enumerated as completed or actively agitated during the preceding year were of direct, immediate and paramount interest to Chicago, except the Croton aqueduct, while of seven great bridges mentioned, five were directly tributary to Chicago! It is easy to show our present interest in the engineering of both land and water, and in so doing we see at once by what means the present greatness of the city has been obtained, and also along what lines its future greatness will be reached. Five million freight cars are received and forwarded at Chicago, annually. This is the terminus for 55,000 miles of railway or nearly one-third of the total mileage of the United States; it is the chief objective point for 85,000 miles of railway or half the total of the United States; 13,000,000 tons of freight carried by 24,000 arriving and departing vessels, the same being one-third the total tonnage of the lakes and rivers of the United States, annually float in our harbor and canal; the vessels of the lake in whose business we have such tremendous interest are valued at nearly $70,000,000 and in respect to size they have gradually increased until now eleven vessels of over 3,000 tons, and one of 5,000 tons are in process of construction; in 1890, 40 per cent. more steam tonnage was built on the lakes than on the seaboard, while the average vessel on the great lakes is twice the size of the average vessel on the seaboard; in 1890, there was 57 per cent. more steam tonnage on the lakes, in the class between 1,000 and 2,500 tons, than on the entire seaboard; last year the total lake shipments were valued at more than $500,000,000. These facts and figures show our great interest in the engineering of transportation and commerce, and also show how we must be especially and peculiarly interested in every scheme for the improvement or development of the American water-ways."

President Harper said that the University stood ready to take up the work that was the special theme of the evening, if the interests represented in the Electric Club would help. A citizen's movement is already on foot to provide apparatus and buildings.

AN ENGINE LATHE, WITH READY ADJUSTMENTS.

Peter Shellenback and William Shellenback, of Richmond, Ind., have invented a new engine lathe in which the adjustments for cutting screw-threads of different pitch may be quickly made without removing and substituting different gears. A further object is to provide an improved automatic feeding mechanism for the carriage and slides and toolstock, whereby the carriage may be fed quickly from one end to the other of the bed or given the proper feed to cut screws of any pitch in either direction. The invention is calculated, also, to control the feed of the main carriage or lower slide automatically by the transverse movement of the upper slide and toolstock, whereby when the tool is in one position the feed is in one direction, and when the tool is in another position the feed is in the opposite direction, enabling the carriage to be returned to the starting point by the simple withdrawal of the tool from the work.

In the accompanying drawings, Fig. 1 is a longitudinal vertical section on an irregular line, with parts broken away to show the underlying mechanism more clearly. Fig. 2 is an end elevation of the lathe. Fig. 3 is a sectional detail showing the connection between the cone gears and the driving train. Fig. 4 is a detail section showing the reversing gear for the feed screw. Fig. 5 is an enlarged detail elevation of the clutch in the reversing gear. Fig. 6 is a rear view of the reversing mechanism in the apron gearing. Figs. 7 and 8 are details of the connection between the upper slide and screw feed reversing mechanism.

The bed or main frame A of the machine, together with the headstock A′, tailstock A^2, spindle B, and dead center B′, together with the cone-pulley B^2, purpose of feeding the screw in the opposite direction the gears H H^2 are loosely mounted upon the shaft E, and are connected by a train of gearing comprising the idler *h* and gears *h′* h^2, rigidly mounted on a sleeve h^3, journaled on the shaft F, by which arrangement, when the gear h^2 is connected with the shaft E by means of a clutch, to be presently described, the direction of rotation of the gear H, and consequently that of the feed screw, is reversed.

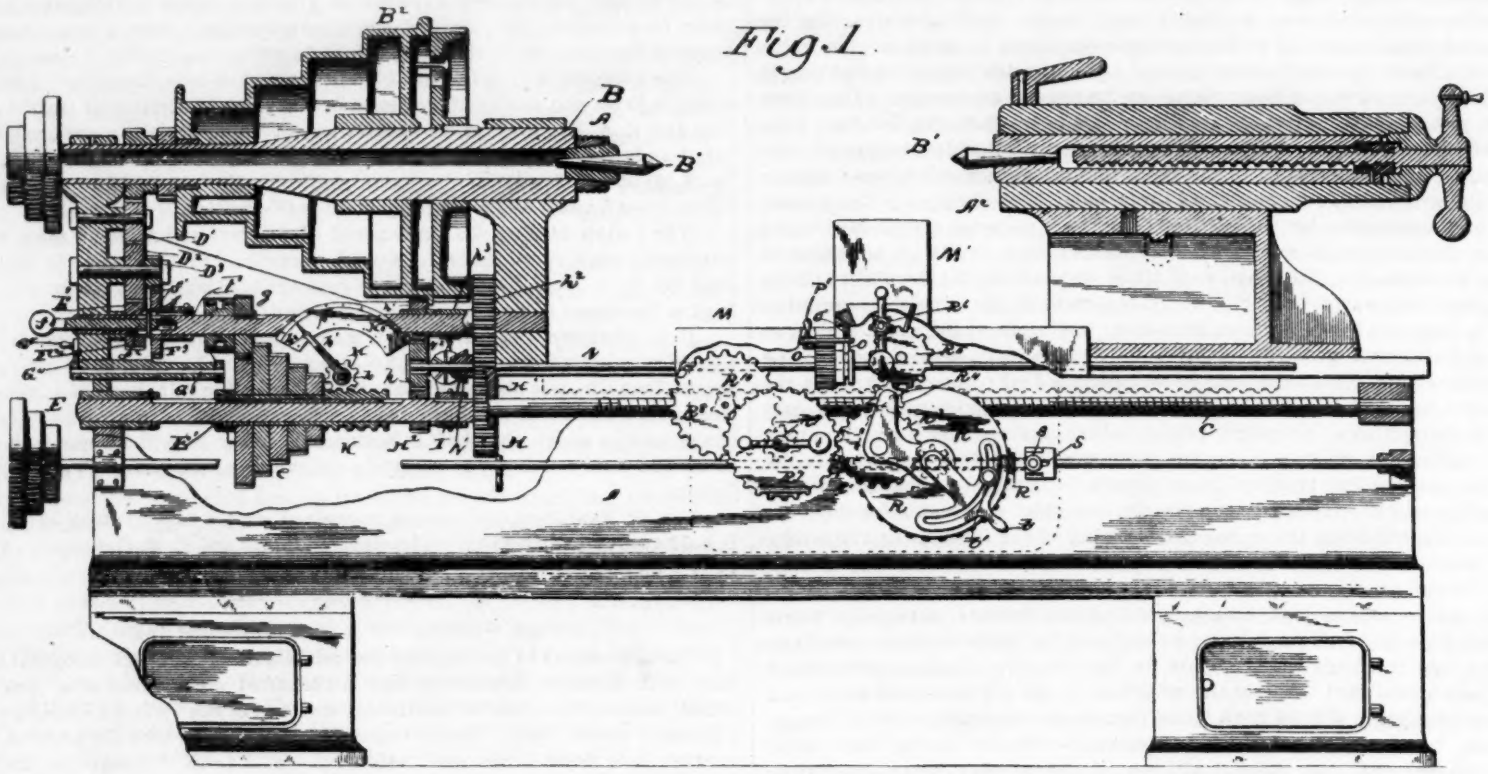
The clutch employed consists, preferably, of a simple collar I, connected with the shaft E by a spline and groove and having on opposite sides pins *i*, adapted to contact with corresponding pins *i′* on one or the other of gears H H^2. (See Fig. 5.)

The carriage lettered M in the drawings slides on the usual ways on the lathe bed, and it is provided with an upper slide M′, moving transversely thereto for carrying the toolstock and tool, which may thus be caused to assume any desired position with relation to the work held between the centers.

In many kinds of work it is desirable that the carriage should move in one direction while the tool is cutting, and when the tool is withdrawn from the work it should return to the starting-point to enable the tool to make a fresh cut, and in order to accomplish this the inventors provide a mechanism moved by the upper slide, which controls the movement of the clutch I. Thus when the slide is moved out the clutch is thrown into co-operation with one or the other of the gear wheels H H^2, and when the slide is moved in it is thrown into engagement with the other of said wheels.

Just within the lathe bed is journaled a small shaft N, preferably square in cross section and carrying at one end a beveled gear N′, meshing with a corresponding gear N^2, pivoted on a bridge or hanger (not shown) and having arms N^3 engaging pins N^4 on a collar N^5, surrounding the clutch-collar I.

Fig. 1.



to which the driving belt is applied, are all of ordinary construction and need no particular description further than to say that the castings for the stationary parts are preferably made hollow for the sake of lightness as well as to provide room for the main portion of the gearing.

The usual feed screw C is journaled in bearings immediately in front of the bed upon which the carriage travels and is rotated to feed said carriage in either direction and at varying speeds to form screws of different pitch by mechanism to be now described.

On the outer end of the spindle is mounted a gear wheel D, which, through an idler D′, communicates its motion to a gear D^2, having, for illustration, 40 teeth, and rigidly connected to a smaller gear D^3, having, for illustration, 20 teeth. Below the gear D^2 D^3 is a shaft F, having gears F^2 F^3 mounted loosely thereon and meshing with the corresponding gears D^2 D^3, said gears F^2 F^3 having, respectively, 20 and 40 teeth in the machine shown. A clutch on the shaft is adapted to connect either one or the other of said last-mentioned gears rigidly to the shaft and impart thereto a rotation of different speed. Thus, when the gear F^3 is connected with the shaft it will rotate just one-half as fast as when the gear F^2 is connected therewith, it being understood, of course, that the speed of the spindle remains the same in both instances.

Below the shaft F is journaled a shaft E of corresponding length and lying parallel thereto, which shaft carries what we shall herein term a "cone," the same consisting of a series or pile of gear-wheels *e*, of varying size, mounted rigidly on a sleeve E′, adapted to slide longitudinally of the shaft E, but connected thereto for rotation by means of a spline and groove. Any one of the gears of this cone is adapted to mesh with a gear wheel *g*, journaled in the end of an arm G and in turn meshing with a gear *g′*, rigidly connected to the shaft F (see Fig. 3). The arm G is hung on the shaft F and may be swung toward and from the cone to bring the gear *g* into mesh with any one of the gear wheels *e*, composing the same, and in the preferred form this arm is provided with a segmental rack G′, with which a pinion G^2 on the end of a shaft G^3 meshes.

The shaft E is geared directly with the screw-feed shaft C by means of the gears H H′ (see Fig. 4) when the screw is turned in one direction; but for the

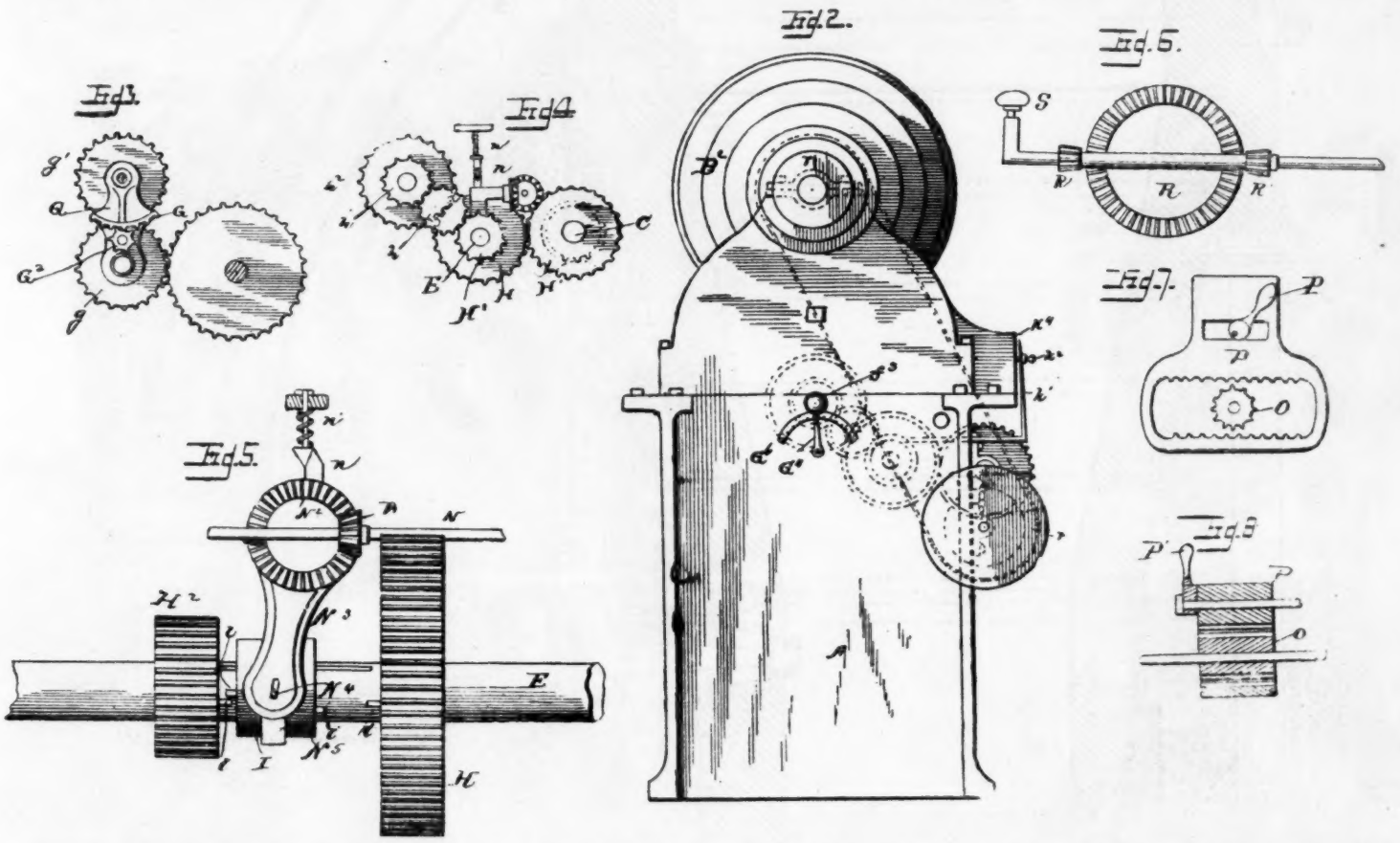
At the top or at a convenient point the gear N^2 is provided with a retainer *n*, which, co-operating with a spring-pressed block *n′*, keeps the clutch in its adjustment and in engagement with one or the other of the gears before mentioned. The shaft N, it will be now understood, is adapted to be turned in one direction or the other by the movement of the upper slide, which may be accomplished in a variety of ways; but we prefer to mount a pinion O on the shaft and connect it to move longitudinally with the carriage by means of a groove *o*, into which a projection, such as O′, on the carriage or slide projects. With this pinion a rack-bar P, moving with the upper slide meshes, and in the preferred construction this rack bar is made double and adapted to engage the pinion at top or bottom and turn it in one direction or the other, as the case may be. The rack bar is held in vertical guides of any kind and is moved by the cam P′, turned by the operator, and holds the rack bar in engagement on either side of the pinion or at an intermediate point when the pinion is entirely out of engagement, and the movement of the slide does not affect the direction of movement of the carriage at all.

Provision is made for running the carriage rapidly from end to end of the bed when disconnected from the feed screw, as well as to feed the slide automatically by means of the apron gearing, as follows: On the apron of the carriage is journaled a relatively large bevel gear wheel R, which is driven by the feed shaft *r*, belted to the spindle by the belt and cone pulleys *r′ r′* at the end and having a pair of bevel pinions R′ mounted on a sleeve sliding thereon, the shaft being squared or provided with a feather and splined to prevent the independent rotation of the pinions. The pinions R′ are separated far enough to stand out of mesh with the gear R when at an intermediate point; but either one may be thrown into engagement therewith by loosening the knurl S, connected to the sleeve, and moving it along in its slot S′ in the apron, thus enabling the direction of rotation of the wheel R to be changed at will. On the gear wheel R is mounted a pinion R^2, and journaled on the same center is a bell crank T, having an operating handle *t* and segment *t′*, with which a set-screw co-operates, to clamp the same in adjusted position. This bell crank at the bend carries a gear wheel R^3, meshing with the pinion R^2, and at the end carries a pinion R^4, meshing with gear wheel R^5 and adapted to mesh with

gear wheel R^5, which in turn meshes with pinion R^6 on the feed screw for the upper slide. This enables the slide to be automatically fed in either direction, when desired, and to feed the carriage quickly a gear R^7 is provided, adapted to be engaged by either the wheel R^3 or pinion R^4, according to the position of the bell crank and direction of feed desired, and the gear wheel is in train with the gear wheel R^8 through the medium of the pinion R^9. (Shown in dotted lines, Fig. 1.) The wheel R^8 carries a pinion R^{10}, which meshes with the rack V on the lathe bed.

The gears may be thrown into action, when desired, to feed the carriage in either direction at a more rapid rate than the screw feed, and, as is usual in this class of lathes, the screw feed is thrown out before the apron gear for feeding the carriage is thrown into gear.

In operation the lathe is extremely simple, and to cut screws of different pitch the operator simply throws the cone or movable gear into proper relative position, which position is indicated exactly by the pointer and scale, and the proper speed connection is made by shifting the clutch *f*. This throws the screw feed into operative connection with the power train, and the carriage is caused to travel along the way in one direction or the other, according to the position of the feed screw reversing mechanism. Assuming that the carriage is traveling away from the headstock and the rack on the upper slide in mesh with the pinion on the clutch operating shaft, when the said slide is moved out or in, according to which part of the rack is in engagement, it will reverse the position of the clutch and cause the screw to turn in the opposite direction. When it is desired to move the upper slide automatically, the apron gear is brought into use and the bell-crank shifted to bring pinion R^4 into gear with the gear wheel R^5, and when the carriage is to be fed quickly the connection is made with the gears R^7 R^8, which operate in the well-known manner in connection with the rack bar.



HOW TO SAVE FUEL IN IRON MAKING.

At the Mason College, Birmingham, January 28, Mr. Thomas Turner, delivered the second of a course of six lectures on "cast iron." In giving a description of the production of cast iron in the blast furnace, the lecturer stated that the quantity of material used to produce one ton of pig iron was very much greater than the weight of iron produced. Thus, in the Middlesbrough district, about 63 cwt. of raw stone is needed to yield a ton of iron, the ironstone being calcined before it is put into the furnace, and thus becomes reduced in weight to about 48 cwt. In addition to this roasted iron ore about twelve cwt. of limestone is added to act as flux, while about a ton of best Durham coke is used as fuel. No less than 5 tons of atmospheric air is needed to burn this fuel, and the whole of this enormous quantity of air has to be heated to a red heat by powerful firebrick stoves on the regenerative principle. The product of the action of the blast furnace, in addition to the ton of iron, is about 1½ tons of slag and about 6½ tons of waste gases. These gases are now almost always utilized for raising steam and heating the blast for the furnace. Thus, in the chief iron-producing district of this country, it is necessary to introduce into the furnace 9 tons of various materials in order to obtain a ton of cast iron, and at the same time it is necessary to in some way dispose of 30 cwt. of slag, which is at present practically valueless. In districts where richer ores are used proportionally smaller weights of ore are needed; but the other materials are nearly constant in quantity. Hence it will be pretty evident that it is extremely unlikely that it will ever be possible to make iron at a much cheaper rate than ruled through the years of bad trade during the eighties. The blast furnace is by far the most economical apparatus we possess from a thermal point of view, though there are still possibilities of improvement even in this direction. In the earliest explanations of the action of the blast furnace it was supposed that the ore was reduced by the direct action of the fuel, in the same way as is the case with other metallic oxides. But more careful investigation showed the great importance of the action of the furnace gases, and it was recognized that in order to get complete reduction of the ore in a coke furnace it was necessary that the proportion of carbon dioxide in the waste gases should not exceed about twelve per cent. In order to obtain this composition it is necessary to employ about 19 cwt. of coke, and this quantity was for some time regarded as the lowest fuel consumption which could possibly be maintained for any lengthened period. But it is now recognized that this minimum is not the theoretical limit of economy, but only the limit under certain conditions of working. It has long been known that where charcoal is used as fuel in the blast furnace the gases may contain a larger proportion of carbon dioxide than is the case with coke furnaces: or, in other words, the furnace gases may be more fully oxidized, and more useful work can be obtained from the fuel. As a natural consequence the fuel consumption is lower in a charcoal than in a coke furnace. But it has also been noticed in America that coke furnaces have been worked in recent years with several hundredweights of coke per ton less than the minimum of 19 cwt. In this district also equally low fuel consumption has been obtained. This economy appears to be connected with the partial reduction of the iron by solid carbon itself, instead of by the furnace gases, especially with porous fuels such as charcoal or soft coke. The iron could be reduced and the metal and slag melted with about nine cwt. of carbon, and it is at present quite problematical how nearly this low limit will be approached.—[Colliery Guardian, London, Eng.

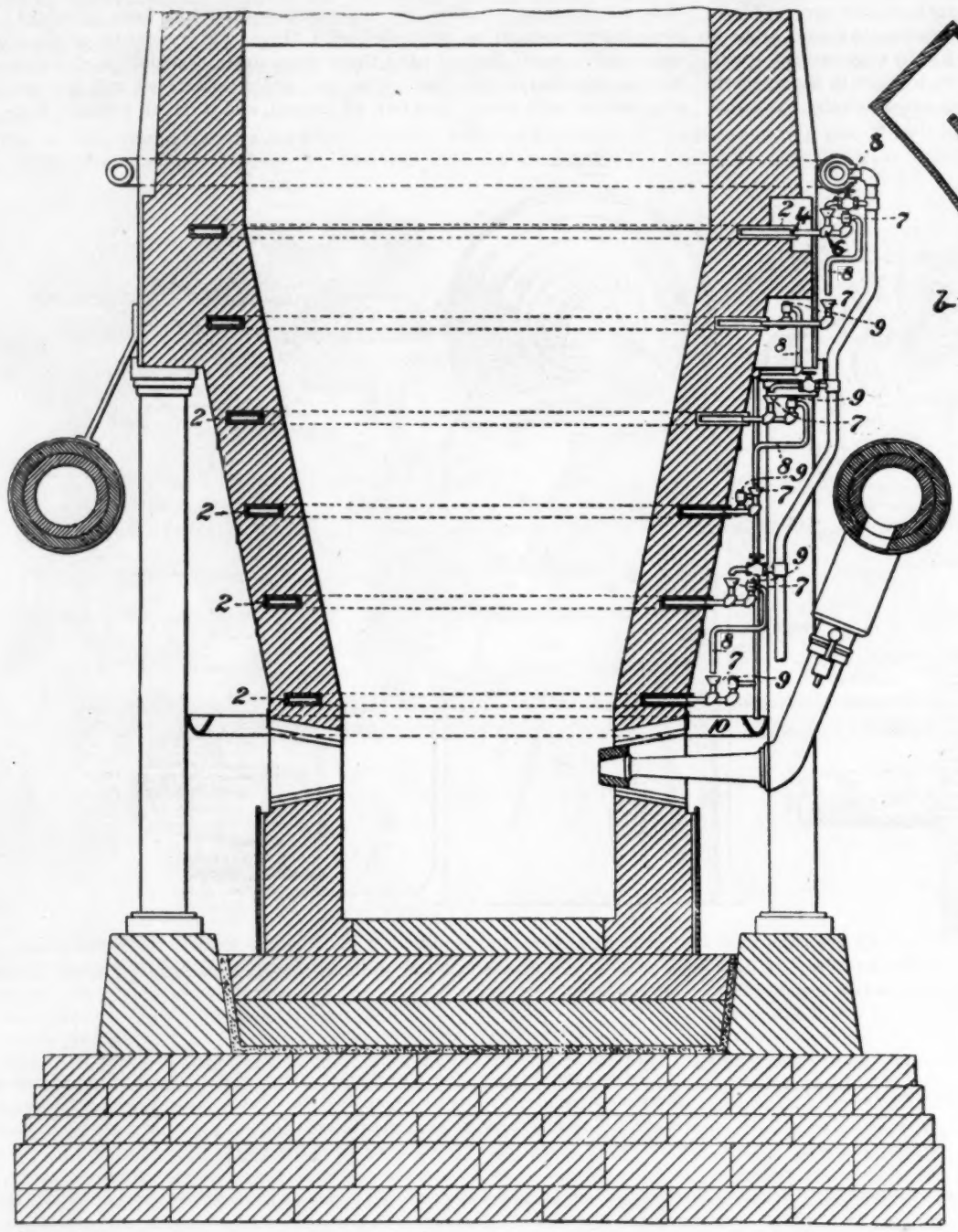
The Effect of Low Water in a Boiler.

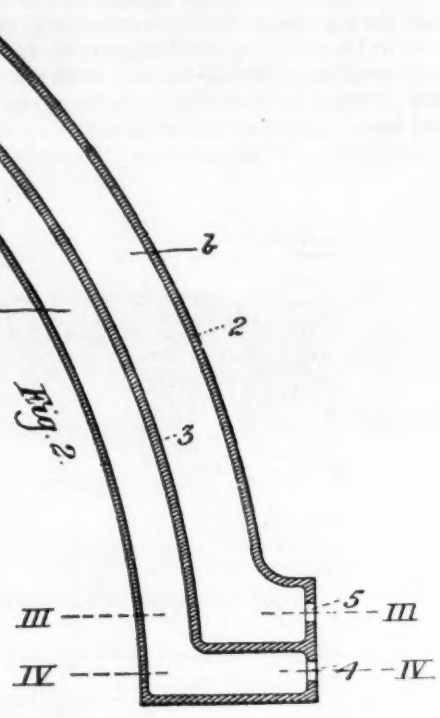
Some months ago the Manchester (Eng.) Steam Users' Association made an exhaustive series of tests regarding the effect of low water on boilers while in use. The result of these experiments is pretty well known to most engineers, for a description of the tests have been published in nearly all the engineering journals. It will be remembered that although the tests were very severe, no explosion was produced which could be attributed directly to low water. The effect of low water in softening the plates is well known and in the case of poor iron the bulging which follows the overheating will result in a rupture, which when once started and backed up by the pressure of steam within the boiler will cause the sheets to tear in such directions as can not be calculated beforehand, as the course will sometimes be through such parts of the boiler as might be considered as being fully as strong as any other part. Crown sheet boilers usually suffer more from the effects of low water than do the other types, principally on account of the large area of flat surface which is overheated. The cry which is always raised of low water whenever a boiler explodes may be the expression of opinion of those making it, but it is seldom borne out by the facts. The principal causes of such explosions will generally be found among the following: poor material in the plates, imperfect construction of the boiler and initial strains set up in the plates by the use of the drift pin; corrosion of plates through want of proper care and attention, producing weakness and inability to resist internal pressure; over pressure of steam; the sudden closing of a valve through which a large volume of steam is escaping, such action producing a hammer-like blow. In the experiments cited, it was found that the introduction of cold water into a boiler that had become red hot from lowering the water level produced no disastrous effects further than straining the seams and rivets and buckling or flattening the crown sheets, and in no case was the boiler burst or the setting disturbed.—[Stationary Engineer.

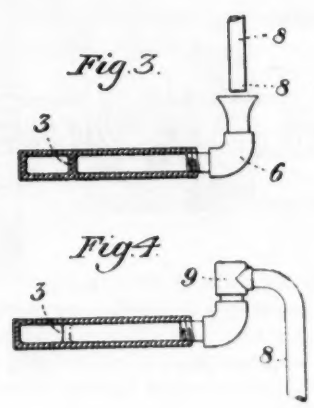
IMPROVED FURNACE BOSH-PLATE.

Thomas W. Pollock, of Brier Hill, O., is the inventor of furnace bosh-plates that have been tested and not found wanting. Heretofore bosh-plates for cooling the walls of blast furnaces, etc., have consisted of metal plates or castings provided with water passages having water supply and discharge pipes connected thereto, and the plates are generally connected in series, so that the water shall flow from one to the other. When in use and subjected to the great heat of the furnace, the plates are apt to burn out, so as to permit the water to leak from them into the furnace, and this by chilling the interior of the furnace produces irregularity in its working, and is often the occasion of serious damage.

The chief objection to former bosh-plates is that they afford no ready means for detecting the occurence of such leaks, and even when abnormal working of the furnace seems to indicate the existence of a leak its exact locality often cannot be determined without spending considerable work in uncoupling the connections, and testing the various bosh-plates. It is the object of Mr. Pollock's invention to remedy these defects and to provide a bosh-plate which will not burn out readily and which affords ready means for detecting the occurence of leaks.







In the accompanying drawings, Fig. 1 is a vertical section of part of a blast furnace provided with the Pollock bosh-plates. Fig. 2 is a horizontal sectional view of one of the bosh-plates. Fig. 3 is a vertical cross section on the line III III of Fig. 2, and Fig. 4 is a similar section on the line IV IV of Fig. 2.

The bosh-plate 2 is a hollow metal casting having a diaphragm or partition 3, which extends from the front end nearly to the rear end, and at its front end curved outwardly, so that when set in a furnace wall the inlet and discharge holes 4 5 at that end shall be outwardly directed. The diaphragm in the casting constitues a two-branch coutinuous passage *b b'*, which extends from the front to the back of the bosh-plate, and thence in the reverse direction and in parallel course to the front. The plate is built horizontally in the furnace wall in the usual manner, and in order to provide for the circulation water through it there is attached to the inlet opening 4 an elbow pipe or connection 6, having an open upwardly directed (preferably funnel shaped) mouth 7, and the supply pipe set so that its end 8' shall be directed toward the funnel mouth and so that it shall be adapted to discharge water freely into the latter. The novelty of this arrangement of the water connections is that the supply pipe is not tightly coupled with the bosh-plate, but so that the inlet of the latter is open, so that the water can be poured into it.

The discharge opening of the bosh-plate is provided with a pipe 9, which extends upwardly and is open at its upper end, and a discharge pipe 8 leads downwardly from the side of the pipe, as shown in Fig. 3.

The operation of the bosh plate is as follows: Water from a suitable elevation or head is admitted into the supply pipe and flows from its end 8' into the funnel mouth 7 of the bosh-plate, and thence through the pipe 6 into and through the current water passage *b b'*, and finally escapes through the pipe 9 into the discharge pipe 8. By reason of the fact that the parts 7 and 9 are open at the top the course of the water through them can be seen and noted, and as the pipe 9 extends somewhat above the level of the mouth of the pipe 8 the water is prevented from escaping through the open end of the former. If there should be a leak in the bosh-plate, its presence will frequently be revealed by steam and gas bubbling up through the open ends of the parts 7 and 9; but if this does not occur its presence can be determined readily by shutting the valves of the supply and discharge pipes. Then if there be any leak in the bosh-plate the level of the water will fall quite rapidly, and this fact can be noted at the open ends of 7 and 9.

Another advantage which results from the invention is that as the water is not supplied to the bosh-plate at high pressure, but simply flows into it, it will not rapidly force itself through any leaks which may occur in the bosh-plate, and in most cases the internal blast furnace pressure, being greater than that of the water, will prevent the outflow of water at the breaks in the casting.

The cut represents the Tod Furnace, at Brier Hill, as fitted up with the plates. It went into blast, October 14, 1889, and is yet in blast, doing good work. The Grace furnace, also of Brier Hill, was fitted up with the plates, has been in operation since June, 1891. In the test the plates have had of nearly two and a half years, they have proved to be all that is claimed for them. Out of the 52 plates put in the Tod furnace only three have given out, and they are of the lower ring, where they can be replaced when deemed necessary. When each of these three gave out, they showed very plainly that water cannot get into the interior of a furnace, should a plate burn out. As will be noticed, the water connections with plates are loose and open, so that the water pressure within plates is not more than three to four ounces to the

square inch, while the internal blast furnace pressure is several pounds to the square inch. When a leak occurs, instead of water going into the furnace, it will by the greater pressure of blast be blown back and out of the large open water inlet and outlet to and from the plates, where it will readily be seen.

RECENT IMPROVEMENTS IN TOGGLE-DRAWING PRESSES.

A revolution has been wrought, in the last few years, in the construction of toggle-drawing presses, and the E. W. Bliss Co., Limited, of Brooklyn, N. Y., has been particularly active in the work of improvement. The most important change this company has made is the perfecting of an arrangement for operating the blank-holder by means of toggles, which entirely dispenses with cams of any description.

Two rock shafts are placed across the back and front of the frame, to which the blank-holder yokes are connected by toggle links. These rock shafts are operated from a crank on the outer end of the main shaft, by a peculiar system of link work, which imparts, through the blank-holder, a much more uniform pressure to the blank than can be maintained in cam drawing presses. The strain arising from the pressure put upon the blank is transferred through the straightened toggles directly to the frame of the press instead of falling on the main shaft, thus relieving entirely the bearings from all friction and wear due to the blank holding. Better and smoother work, with fewer wasters, greater durability, and less consumption of power, are the principal advantages gained through this toggle movement. The main frame, of all sizes up to and including No. 5, is made of a single casting, thus imparting great strength and rigidity to the whole structure. The main shaft is of forged steel, with a crank slotted out to operate the plunger. This plunger is guided on the inside of the blank-holder slide, and connected to the crank by a pitman with steel adjusting screw provided with right and left hand ratchet collars for quickly adjusting same. The adjustment of the blank-holder is made by means of four steel screws, as plainly shown in the illustrations.

In the larger sizes, power is communicated to the back shaft through a powerful friction clutch, which, in connection with an automatic brake, places the movements of the press entirely under the control of the operator, so that the press can be stopped and started instantly at any point of the stroke.

Toggle-drawing press, No. 14, shown in Fig. 1, is adapted for drawing a large variety of heavy work, including the largest articles made of tinplate, and nearly everything drawn of black iron and steel in the manufacture of enameled iron ware. It is also used to advantage for drawing kitchen and bath boiler heads, soda fountain cylinders, the smaller sizes of sinks, heavy brass and copper goods, and many other articles of similar character. The standards are connected with the die bed below, and a heavy top brace above, by means of four 4¼-inch steel bolts, which take the main stress of the press action, thus relieving the cast iron parts of the frame from all tensile strain. The movements of this press are under perfect control through the hand lever shown, which actuates a powerful friction clutch and brake. The slides can be instantly stopped, started or held at any point of the stroke.

Fig. 2 shows a toggle joint double action press, No. 182. The application to this and other presses of the E. W. Bliss patent toggle movement has greatly increased their simplicity, durability and smoothness of action as compared with the old style cam presses. Less friction and wear, less consumption of power, and a more perfect dwell of the blank-holder are the principal points of superiority. Another point in these presses is the ease and accuracy with which the blank-holder can be adjusted so as to bear evenly all around the blank, without "packing" the dies. These presses are specially adapted for making blacking boxes, baking powder tops, lard pail covers, round, oval, square and oblong tin boxes for chemicals, powders, tobacco, etc, burners, lantern parts, gas fixtures, curtain pole ends, sleigh and gong bells, cane heads, ferrules, cartridge shells, etc.

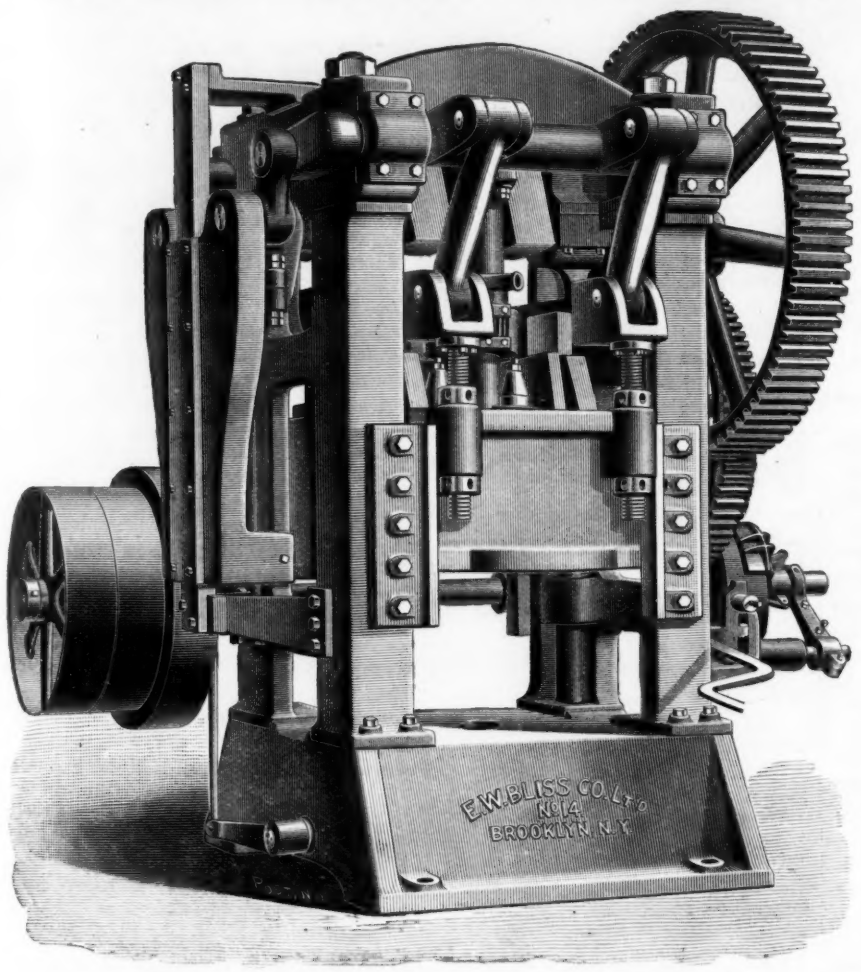


FIG. 1. BLISS TOGGLE-DRAWING PRESS.

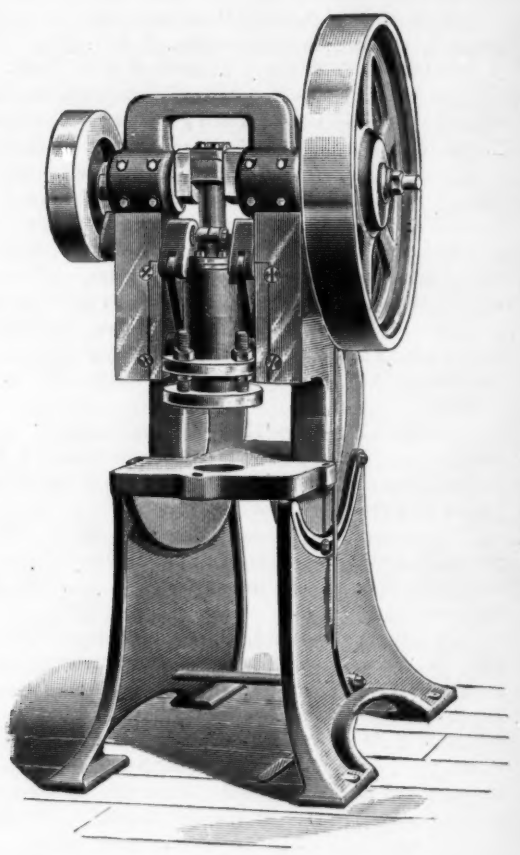


FIG. 2.

English Iron Men Disturbed by "Stealthy" Belgian Competition.

The course of prices, alike for crude and finished iron, has been fairly run on the standard re-declared at the quarterly meeting held a fortnight ago, in Birmingham, but the current demand for most sorts of iron certainly lacks anything like strength and vitality. A striking example of this slowness of demand are sheets for galvanizing. Of these all the principal works in the district have curtailed their production, and at one noted establishment not more than one-fourth of the 25 puddling furnaces are in operation. The disturbances in the Argentine, Brazil, and other South American markets—which are usually such great customers for this sort of iron—may partially explain the depression, but there can be no doubt that some of it is due to the stealthily-nearing Belgian competitor. Since the new year came in Staffordshire makers have had to confront the fact of samples of Belgian sheets offered in London at 7s. 6d. to 10s. per ton lower than the current rate for Staffordshire sheets of corresponding quality. Of course, it remains to be proved whether in the event of business the bulk will equal the sample, and there is, moreover, the important consideration that, while Staffordshire sheets cost 12s. 6d. per ton to deliver in London, the freight for Belgian sheets from Antwerp is only 4s. 6d., and the railway transit from the works to the port would not raise the total cost to more than 8s. per ton. The real reason of the severity of the competition is, of course, the longer hours and lower pay of the Belgian as compared with the English ironworker, and it is high time that the advocates in this country of a social and industrial milennium began to recognize whither they are drifting.—[Colliery Guardian, London.

Maine Again a Manufacturing State.

Maine's record for new enterprises the past year is a good one, and shows some active work on the part of her enterprising business men. Over 100 new manufacturing industries were established during 1891, not including a large number of small ones, which are capable of enlargement. This is an encouraging sign of the growth and development of New England industries, and is very creditable to the citizens of the Pine Tree State.—[Manufacturers' Gazette, Boston.

IN a new lubricating cup for cross heads, wrist pins and other moving parts of a steam engine, the oil is supplied by means of a ball suspended from the top of the chamber, and swinging back and forth with the motion of the engine over the outlet in the bottom, forcing a little oil through on to the pin each time. The flow of oil may be regulated by means of a thumb screw on the top of the cup which raises or lowers the ball.

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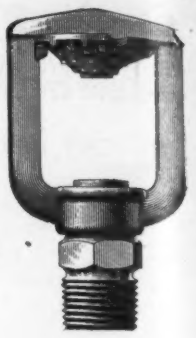

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INDUSTRIAL SUMMARY.

New Enterprises:—

The following recent incorporations, specially reported for *The Iron Trade Review*, are of interest to the iron and machinery trade:

Lanark, Ill.— Lanark Manufacturing Co.; capital, $10,000; to manufacture grain separators; incorporators: J. E. Laird, W. S. Crinklaw, Ellis Moore, E. J. Barklow, G. C. Taber, J. L. Mather, E. C. Dick.

Lockport, Ill.—The Automatic Grain Separator Co.; capital, $6,000; to manufacture, operate and sell grain separator machines; incorporators: D. W. Long, C. A. Goodale, C. M. Alexander, A. G. Hawley, R. J. McCahon.

Decatur, Ill.—The Decatur Steel Roofing & Corrugating Co; capital, $25,000; to manufacture steel and iron roofing and hardware specialties; incorporators: Lewis S. Bonbrake, James L. Thayer, Stephan W. Thayer.

Chicago, Ill.—Chicago Clothes Dryer Works; capital, $20,000; for the manufacture and sale of clothes dryers, and gas appliances of all kinds and descriptions; incorporators: Edward Porter, Edgar Bliss, Wm. Porter.

Cleveland, O.—The Steel Platform Binder Co.; capital, $250,000; for the manufacture and sale of platform binders, agricultural implements, etc.; incorporators: A. J. Johnson, H. J. Herrick, W. D. Drake, W. P. Johnson, O. M. Stafford.

Chicago, Ill.—The Kubec Cash Register Co.; capital, $60,000; to manufacture, rent, lease and sell cash registers, and dispose of the right to manufacture, and sell same; incorporators: Millard F. Riggles, Frederick Kubec, James B. Meier.

Tremont, Pa.—Tremont Engine & Boiler Works; capital, $100,000; for the purpose of manufacturing iron and steel or both, or any other metals, etc.; incorporators: C. W. Brower and D. J. Lewis, Tremont, Pa., Wm. Schwenk, Minersville, Pa.

Cleveland, O.—The D. L. Scheier Furniture Co.; capital, $50,000; for the purpose of manufacturing, selling and dealing in house, store and other furniture, upholstered goods; incorporators: Peter Linn, Chas. C. Schroeder, Daniel L. Scheier, J. Korabeck, Chas. Mauver.

New York City, N. Y.—The Carbon Incandescent Gas Tip Co. (incorporated in W. Va.); capital, $500,000; for the manufacture and sale of gas tips, gas burners and fixtures of every kind for gas or electricity; incorporators: I. Samuels, Benj. F. Devoe, Wendel Samuels, all of New York City, N. Y.

Chicago, Ill.—The Hoyt Gold & Silver Amalgamating Co.; capital $1,000,000; to build machinery for amalgamating gold and silver ores, erect plants, buy rights and patents, and operate gold, silver and copper mines, etc., and do general mining business; Fred. J. Hoyt, Wm. H. Chandler, Wm. H. Doolittle.

New York City, N. Y.—New Jersey Iron Ore Co. (incorporated in West Virginia); capital, $300,000; for the purpose of owning, holding and disposing of all kinds of mining property and leases; construct railroads, telegraph lines, bridges, etc; incorporators: Geo. W. Robinson, A. P. Morrison, Wm. Forstner, all of New York City, N. Y.

OTHER NEW CORPORATIONS.

Wellington (O) Machine Co. has been chartered, to run a foundry and manufacture wood-working machinery.

The boiler making firm of Tippett & Wood, at Phillipsburgh, N. J., have been incorporated, with a capital stock of $20,000.

At Harriman, Tenn., the Harriman Furnace Co., capital stock $500,000 has been organized, for the purpose of erecting an iron furnace.

At Geddes, N. Y. the Mohawk Furnace Co. has been incorporated, to smelt and reduce iron ore and manufacture pig iron. Capital, $30,000.

The United Steel Co., of Pittsburgh, were granted a charter of incorporation last week. Geo. B. Motherell, of Allegheny, Pa., is treasurer of the new concern.

The Henry Dalton & Sons Co. have filed articles of incorporation at Oakland, Cal. The capital stock is $100,000, and the purpose is to conduct foundry and machine shops, etc.

The Queen City Iron Co., of Queen City, Tex., have filed a charter. The capital stock is $400,000, and the object of the corporation is to manufacture pig iron, fire brick and tiling. It is said that the company will erect a blast furnace.

The old Consolidated Iron Works plant, at Riverdale, Kan., has been purchased by the Consolidated Iron Co., recently chartered. The company will begin operations at once, and will manufacture sash weights, and do a general casting business.

A bill to incorporate the Electric Light & Power Co., of Baltimore County, has been introduced in the Legislature. It is empowered to manufacture and sell electricity for light or power, etc., at Townson, Md. Among the incorporators are W. D. Randall, J. E. Ingram, W. C. Loundes and others; capital stock, $500,000.

The Pittsburgh *Dispatch* says that C. L. Magee, James D. Callery, P. H. Griffin, G. L. McFarland and R J. Mercur have applied for a charter for a company to manufacture car wheels, to be called the Pittsburgh Car Wheel Co. The works will be erected in or near Pittsburgh, and the company will make a specialty of street car wheels.

Denver (Col.) Steel Rolling Mills Co., capital $5,000,000, has been incorporated by F. P. Ernest, W. N. Byers, C. D. Cobb, W. G. Evans, J. J. Joslyn, E. T. Loy, E. H. Webb, E. A. Beers and George W. Campbell. The new plant will be adapted to the manufacture of merchant iron and steel and steel rails for mining car tracks. The plant will also draw wire and wire rods of all kinds, manufacture different kinds of barb wire, wire staples, baling wire and cotton ties, wire nails and all articles commonly manufactured of wire. Five main buildings are to be built. Two will be 80x180 feet in dimensions, two others will be 50x160, and the fifth will contain the office and storerooms of the company.

Additions, Enlargements, Removals, Etc.:—

The Southern Emery Wheel Co. has begun work on its new plant at Tallapoosa, Ga.

Directors of the British Columbia Iron Works increased the capital stock to $250,000.

About $1,400 worth of new machinery will be set up in the plant of the Taylor (Tex.) Ice Co.

The new steel plant annex to the Chester (Pa.) Foundry will be 100 feet longer than at first intended.

The Napier Iron Furnace Co., of Napier, Tenn., has increased its capital stock from $225,000 to $300,000.

The Moffatt Journal Bearing Co., of Chicago, have increased their capital stock from $100,000 to $1,000,000.

Park Bros. & Co., Limited, of Pittsburgh, Pa., will increase the capacity of their Black Diamond Steel Works by the erection of two new mills.

Troy (N. Y) Co-operative Stove Works, consisting of ten buildings, engine, shafting and machinery, have been sold to William H. Howe, for $20,000.

The Radford Pipe & Foundry Co. has completed arrangements for putting in three new cranes, and otherwise improving the Anniston (Ala.) Pipe Works.

The Worcester (Mass.) Electric Light Co. will issue $50,000 additional stock and also $100,000 in bonds. The incandescent plant of the company will be enlarged.

The National Steel Pipe Manufacturing Co., of San Diego and National City, Cal., are building branch works at Perris, Cal., and expect to turn out pipe in a month.

The Donaldson Pipe Mills at Emans, Pa., will be enlarged by an addition of 100 feet, increasing its capacity one half. The management is unable to supply the increasing demand for pipe.

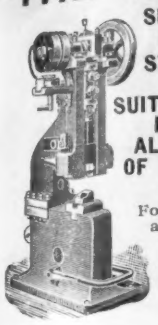
The Shelby (O.) Steel Tube Co. have recently completed a new brick building 31x100 feet, a new frame building 31x100 feet, and are now putting the roof upon another new brick building 100 feet square. A warehouse 50x80 feet is also going up, and as soon as the weather will permit, the company will commence the erection of another new rolling mill building 80x100 feet. They have now in operation seven benches, turning out a product of from 2,000 to 3,000 feet of tubing per day, have placed an order for six more additional benches and anticipate, by June 1st, to increase this to at least 20 more, giving them a total capacity of 33 benches. The company has also placed an order for another pair of double engines and two rolling mills. They now employ 75 men.

Fires and Accidents:—

The plant of the Hurlbut Manufacturing Co., at Racine, Wis., has been destroyed by fire, at a loss of $20,000.

The Electric Advertising Scale Co's. factory, Waukegan, Wis., was totally destroyed by fire on the 17th inst. Loss $20,000, partly covered by insurance.

THE HACKNEY POWER HAMMER.



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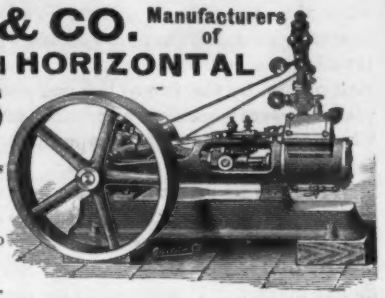

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The foundry of the Vulcan Iron Co., at New Castle, Pa., has been destroyed by fire, together with a large amount of valuable tools and machinery. The loss will reach $10,000.

General Industrial Notes :—

Tacoma, Wash., subscribes $80,000 to secure the Delano Iron & Steel Works.

The Missouri Malleable Iron Co. will occupy its new plant at St. Louis, Mo., about April 1st.

Contracts have been let for the building of the South Boston Iron Works at Middlesborough, Ky.

Decatur Land, Improvement & Furnace Co. will meet Feb. 29 to consider plan for a new $1,250,000 company.

An ice factory will be built at Pine Bluff, Ark., by a company with $60,000 capital. Henry Cook is an incorporator.

Joliet Steel Rolling Mill Co., Joliet, Ill., is said to have secured necessary capital and will begin building in the Spring.

The California Engineering Co., of Chicago, Ill., is talking of establishing a $1,000,000 steam engine manufacturing plant.

The Whittier Machine Co. will build a machine shop, 140x82 feet, at Granite and First streets, Boston. Brick, with monitor roof.

The Groveland Foundry, at Dighton, Mass., has been purchased by Boston and Taunton parties, who will operate it in the near future.

C. W. S. Turner has made the citizens of Hagerstown, Md., a proposition for the establishment of a steel plant of 90 tons daily capacity.

A vein of tin 100 feet in width, and said to "run 15 per cent." in the metal, is reported in the mountains about 50 miles north of Denver, Col.

H. H. Haines, of Rising Sun, is reported as having purchased the fertillizer and sulphuric acid works of the Clendenin Manufacturing Co., Colora, Md.

A conference of wire-nail manufacturers held in Cleveland, last week, went over the state of business at length, and re-affirmed prevailing prices.

The first of the big armor plates made at Bethlehem, Pa., for the coast-defense ship Monterey are expected to reach San Francisco about the 25th inst.

The Cambria Iron Co., of Johnstown, Pa., recently purchased a large tract of coal land, near Conemaugh, Pa., to enlarge its coal supply at a convenient point.

The Chesapeake Nail Works and the puddling department of the Central Iron Works, at Harrisburg, Pa., has shut down, throwing between 200 and 300 men out of work.

The pipe works at Bridgeport, Ala., have been completed and have made their first run. The plant will turn out only the large sizes of iron pipe, from 20 to 24 inches diameter.

Reported that the three Cole furnaces in Sheffield, Ala., have been sold to an English syndicate that will put them in operation at an early day. They have been idle for a long time.

The Alton Transparent Oil Cup Co., of Alton, Ill., manufacture, a cup for which are claimed the merits of sending only pure oil through the tube, of having a reliable cup and of being readily cleaned.

The Economic Gas Co., of Chicago, have, it is announced, purchased a site for the $1,000,000 plant which they propose to erect. Thirty miles of pipe are already laid, and it is calculated to lay 70 before the close of the year.

The Penn Steel Casting & Machine Co. is being formed, with capital of $150,000, for the purpose of conducting open-hearth steel works, at Chester, Pa. Fred Baldt, formerly connected with the Standard Steel Co., will be the General Manager.

Andrews & Hitchcock, of Youngstown, have not dissolved, as has been stated in some of the trade papers, but have sold their iron business to the Andrews & Hitchcock Iron Co., who will continue to manufacture the Hubbard Scotch foundry iron.

Grace furnace, Brier Hill, O., made in December, 1891, 7,032½ tons of foundry iron, and in January of this year, 8,117½ tons No. 1 Bessemer. The record for the first week in February was 1,687½ tons No. 1 Bessemer, and the best day's run was 262½ tons.

The steel plant of the Syracuse Steel Foundry Co., at Syracuse, N. Y. burned Jan. 7, is being rebuilt. Its open-hearth plant will contain two 10-ton furnaces as before. The company will not rebuild its crucible steel plant, but will manufacture open-hearth steel castings entirely.

The Totten & Hogg Iron & Steel Foundry Co., of Pittsburgh, Pa., have just closed a contract with the Midland Steel Co., of Muncie, Ind., for a large universal and blooming mill combined, complete with 100 feet of roller table. This mill is for a new plant which they are now erecting at Muncie, Ind.

The Anderson, Ind., Rolling Mill Co. has accepted the offer of the Citizens' Enterprise Co., of Muncie, Ind., and will remove its plant at once to Muncie. Secretary and General Manager V. O. Foulk is now on the ground at Muncie, and the erection of 9-inch mill 50x250 feet will begin at once. The company's 8-inch mill at Anderson will continue in operation until the completion of the new one at Muncie, and will then be removed also. The company will add, too, a puddling furnace and a set of sheet rolls.

The mines of the Tennessee Mining Co., at Briceville, will be worked upon the co-operative plan. The miners are allowed to take stock, and have taken $10,000. A subscriber is allowed twenty months in which to pay for $100 share. The company will erect residences and allow the miners to buy on liberal terms.

The rather threadbare story of Edison's being schemed out of control of the big electric companies bearing his name has been set loose again in connection with the Edison and Thomson-Houston combine. Edison comes out with a prompt denial of the report—which represented that his interest had dwindled down to one-tenth in the consolidation process—and intimates that he's entirely satisfied.

William S. Raynor, President of the Curtis Bay Harbor & Improvement Co., of Baltimore, has purchased the plant of the Paterson Iron Co., of Paterson, N. J., which will be transferred to and operated at Curtis Bay within the next three months. The works will be run by the Baltimore Rolling Mill Co., and will give special attention to the manufacture of steel plates. Curtis Bay is a part of Baltimore harbor.

American Tinplate Co., of Elwood, Ind., have placed their order for machinery in Youngstown, O., and buildings are now in readiness to receive it. The company has been carrying on extensive experiments preparatory to the building of the down-draft apparatus in its dipping works, making first a model in miniature. The results were very satisfactory. This will be the largest tinplate mill in the country.

Sealed proposals will be received at the office of the Supervising Architect, Treasury Department, Washington, D. C., until 2 o'clock P. M., March 22, 1892, and opened immediately thereafter, for all the labor and materials required for the erection and completion (except general excavation and heating apparatus) of the U. S. Postoffice building at Beatrice, Neb., in accordance with drawings and specification, copies of which may be had at the Supervising Architect's office, or the office of the Superintendent at Beatrice, Neb.

The interests of Lake Erie harbors were presented to the House Committee on Rivers and Harbors, on Saturday, by Congressmen Johnson and Taylor. The importance of Cleveland, Fairport and Lorain, as ore-receiving points, was urged by Congressman Taylor, and Congressman Johnson, in emphasizing the importance of Cleveland as a shipbuilding and ship-owning city, told the committee that if there was to be retrenchment, the harbors were not the place to begin. Last year $75,000 was given Cleveland on an estimate of $300,000. The estimate this year is $400,000.

Sealed proposals will be received at the office of the Supervising Architect, Treasury Department, Washington, D. C., until two o'clock, P. M., March 16, 1892, for all the labor and materials required, and fixing in place complete the low-pressure, return circulation, steam-heating and ventilating apparatus for the United States Court House and Post Office at Asheville, N. C., in accordance with the drawings and specification, copies of which may be had on application at the Supervising Architect's office, or the office of the Custodian at Asheville, N. C. Bids will also be considered for any other system of heating and ventilating in lieu of the above, and parties proposing to supply such must submit with their proposal plans and full specification for same.

During the past month, the firm of Warren Webster & Co., 491 N. Third street, Philadelphia, Pa., manufacturers of the Webster vacuum feed water heater and purifier, have booked the following orders for vacuum economizers: North Packing & Provision Co., Somerville, Mass., one 1,800 h. p.; Sherman & Co., Antwerp, Belgium, three 30 h. p.; Pennsylvania Tube Works, Pittsburgh, Pa., one 1,000 h. p.; Armour Co., Chicago, Ill., one 1,200 h. p.; W. L. Kahn & Co., Pittsburgh, Pa., one 100 h. p.; Hubbard & Co., shovel factory, Pittsburgh, Pa., one 100 h. p.; Apollo Iron & Steel Co., Apollo, Pa., one 200 h. p.; Boughen Engineering Co., Cincinnati, O., one 750 h. p.; National Tube Works Co., McKeesport, Pa., one 1,200 h. p.; W. W. Farrier, Jersey City, one 75 h. p., for Journal Building, Jersey City; Charles Parker & Co., Meriden, Conn., one 150 h. p.; United States Iron & Tinplate Co., Demmler, Pa., one 300 h. p.; Morrison & Case Paper Co., Tyrone, Pa., one 1,000 h. p.

A COMPOUND TO AID COMBUSTION AND SAVE FUEL.

The Standard Coal Co., 244 Washington street, Boston, Mass., owns and operates a chemical compound for combining with coal, which has been found by test to possess many advantages. The claims made for it are briefly stated as follows: It promotes the combustion of the coal by re-enforcing the fires, producing a higher temperature, and generates more steam than when coal is burned in its natural state. It retards the gases and prevents the escape of smoke or free carbon and causes complete combustion. It increases the horse-power of boilers and prevents the formation of clinkers, and makes one-half less ashes, and effects an economy in the consumption of coal treated with these chemicals, from 15 to 30 per cent. The inferior or low grades of coal, such as culm, screenings, lignite, etc., when thus treated, will produce as much heat as higher grades of coal for boilers, locomotives, etc.

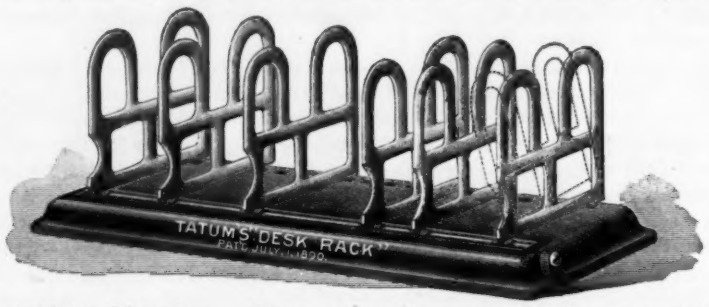
No alterations are required in the setting of the boilers for burning coal

when thus treated. It will do away with nearly all smoke, cinders and gases that now escape from locomotives, smoke-stacks and chimneys. The cost, it is estimated, will not exceed one-fifth of the economy effected in the consumption of coal by the use of the compound. It will save the grate bars and displace blowers which are expensive to keep in running order as at present in use. There is nothing in the compound that is dangerous or explosive, nor deleterious to the iron in the boiler. The compound is particularly valuable for locomotives on railroads, ocean steamers and manufacturing industries, and on locomotives it will increase their carrying capacity and assist in hauling the trains over heavy grades.

H. L. Bowker, Massachusetts State assayer, thus reports the result of tests he has made: "It appears to be composed of chemical ingredients, that retain the gases and prevent the escape of free carbon or smoke, thereby increasing the heat obtained from the coal. Its action upon the grates, tubes, or surface of the iron exposed, is much more favorable than the coal burned in its natural state: the iron is cleaner and less liable to corrode. The tests made for the action of the chemically treated coal upon iron, were conducted in a large furnace at a high temperature, the iron carefully weighed and otherwise tested, with the results as before stated."

TATUM'S NEW DESK RACK.

The Sam'l C. Tatum Co., of Cincinnati, O., have added to their line of stationers' specialties, a neat desk rack, made with nickeled brass partitions



(adjustable) and iron base. The cut shows it so well that a long description is not necessary. The rack is for holding envelopes, cards and "what not" on one's desk. There are no wires to bend or break, and the room occupied by the device is small enough to make it a convenient article on the top of one's desk.

THE Manufacturers' Club, of Philadelphia, desires to erect a building in the Exposition grounds, in Chicago, constructed entirely of material made by members of the club, with intent that it be headquarters for manufacturers, not only of Philadelphia, but of the entire country

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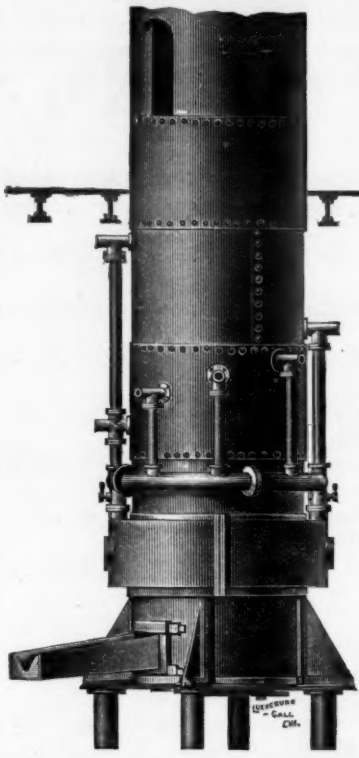

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Stronger and more durable than iron forgings in any position, or for any service whatever.
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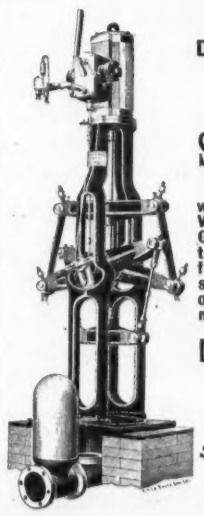

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CLEVELAND (f. o. b. cars, net cash, Bessemer, $15 70; No. 1 Foundry, $15 20; No. Foundry, $14 70; No. 1 Gray Forge, red short $14 20; No. 2 Gray Forge, neutral, $14 20; No 1 American Scotch, $15 70; No. 2 American Scotch, $14 70.

CHICAGO (reported by Messrs. Rogers, Brown & Merwin): Southern Coke No. 1. foundry, $16 00 @16 75; Southern Coke No. 2 Foundry, $15 00 @15 75; Southern Coke No. 3 Foundry, $14 25 @15 00; Southern Coke No 1, Softeners, $15 00 @15 75; Southern Coke No. 2, Softeners, $14 25 @15 00; Ohio Silveries No. 1, $17 50@18 50; Ohio Silveries No. 2, $16 50@ 17 50; Ohio Strong Softeners No. 1, $18 00@19 00; Ohio Strong Softeners No. 2, $17 00@18 00; Lake Superior Charcoal Nos. 1 to 6, $17 00@18 00; Tennessee Charcoal No. 1, $1700@18 00; Tennessee Charcoal No. 2, $16 50@17 50; Southern Standard Car Wheel, $21 00@23 00; Tennessee Standard Car Wheel, $00 00@00 00.

CINCINNATI (reported by Rogers, Brown & Co.): FOUNDRY IRONS—Southern Coke, No. 1 foundry, $14 50@15 00; Southern coke, No. 2 and No. 1 soft, $13 50@$14 00; Hanging Rock Coke, No. 1 foundry, $16 00@16 50; Jackson Co. Stone Coal, No. 1 foundry, $16 50@17 00; Tennessee Charcoal, No. 1 foundry, $16 75@17 00; Hanging Rock Charcoal, No. 1 foundry, $19 75 @20 00. MILL IRONS—Standard Southern Coke, grey forge, $12 25@12 50; Standard Southern Coke, mottled, $12 00@12 25; Cold Short Southern Coke, grey forge, $12 75@13 00; Strong Ohio Neutral Coke, grey forge, $15 00@15 50. CAR WHEEL AND MALLEABLE—Standard Alabama Car Wheel, $19 00@20 00; Tennessee Car Wheel, $17 50@18 00; Lake Superior Car Wheel, $19 00@19 50.

BUFFALO (reported by Rogers, Brown & Co.): Mahoning and Shenango Valley strong, No. 1 Foundry, $16 25@00 00; Mahoning and Shenango Valley strong, No. 2 Foundry, $15 25 @00 00; Ohio Softener No. 1, $16 20@00 00; Ohio Softener No. 2, $15 20@00 00; Jackson Co., Silvery No. 1, $18 00@00 00; Jackson Co. Silvery, No. 2, $17 00@00 00; Lake Superior Charcoal, $17 50@18 50; Tennessee Charcoal, $18 25@00 00; Southern Softener No. 1, $15 50@00 00; Southern Softener No. 2, $14 75@00 00; Southern Strong No. 1 Foundry, $16 50@00 00; Southern Strong No. 2 Foundry, $15 50@00 00· Alabama Car Wheel, $19 75@20 75; Hanging Rock Charcoal, $21 00@22 00.

LOUISVILLE (reported by Hall Bros. & Co.) HOT BLAST FOUNDRY—Southern coke No. 1, $14 00@14 25; Southern coke No. 2, $13 25@13 75; Southern coke No. 3, $13 00@13 25; Mahoning Valley (Lake ore mix,tures), $00 00 :00@00 Southern charcoal, No. 1 $16 00@17 00; Southern charcoal, No. 2, $15 50@16 00; Missouri charcoal, No. 1, $17 00@17 50; Missouri charcoal, No. 2, $16 50@17 00. FORGE—Neutral coke, $12 50@12 75; Cold short, $12 25@12 50; Mottled, $11 50@12 00. CAR WHEEL AND MALLEABLE—Southern (standard brands), $18 00@ 18 50; Southern (other brands), $17 00@17 50; Lake Superior, $19 50@20 50.

ST. LOUIS (reported by Rogers, Brown & Meacham): HOT BLAST COKE AND CHARCOAL—Southern Coke No. 1, $15 25@15 50; Southern Coke No. 2, $14 25@14 50; Southern Coke No. 3, $13 50@14 00; Southern Grey Forge, $13 00@ 13 25; Southern Charcoal No. 1, $17 00@17 50; Southern Charcoal No. 2, $16 25@16 75; Missouri Charcoal No. 1, $15 50@16 00; Missouri Charcoal No. 2, $15 00@15 50; Ohio Softeners, $18 00@ 19 00. CAR WHEEL AND MALLEABLE IRONS—Lake Superior, $19 50@20 00; Southern, $19 50@ 20 00. CONNELLSVILLE COKE—East St. Louis, $0 00; St. Louis, $5 65.

DETROIT (reported by William F. Jarvis & Co.): Lake Superior Charcoal, all Numbers, $17 00@18 00; Lake Superior (coke) Bessemer, $16 50@17 00; Katahdin (Maine charcoal), $00 00 @00 00; Lake Superior Coke, Foundry, all ore, $17 00@18 00; Lake Superior Coke, Foundry, all ore, $00 00@00 00; Standard Ohio Black Band, $17 50@18 00; Southern No. 1 $15 25@15 50; Southern Gray Forge, $13 50@ 14 00; Jackson County (Ohio) Silvery, $18 00@ 18 50; Old Car Wheel, $00 00@00 00. Connellsville Coke, $0.00.

LOUISVILLE (reported by Geo. H. Hull & Co.): Southern Coke No. 1 Foundry $14 00@ 14 50; Southern Coke No. 2 Foundry $13 00@ 13 50; Southern Coke No. 3 Foundry $12 50@ 12 75; Grey Forge, $12 00@12 25; Southern Coke Silver Grey, $00 00@00 00; Southern Charcoal No. 1 Foundry, $15 75@16 75; Car Wheel, $18 00@19 00.

PITTSBURGH (reported by A. H. Childs): No. 1 Foundry, $15 50@15 75; No. 2 Foundry, $14 50@14 75; Grey Forge, $13 25@13 50; White and Mottled, $12 75@13 00; Warm Blast Charcoal, $18 00@22 00; Cold Blast Charcoal, $22 00 @26 00; Bessemer, $15 00@15 25.

MERCHANT IRON AND STEEL.

Flat Bar

1½ to 4 by ⅛ to 1 inch	1 70
4¼ to 6 by ⅛ to 1 inch	1 35
1½ to 6 by 1¼ to 2 inch	2 15
1¼ & 1½ by ⅜ to ¾ inch	1 85
1 & 1¼ by ⅜ to ¾ inch	1 95
⅛, ¼ and ⅜ by ⅜ to ⅝ inch	2 15

Round and Square.

1 to 1⅜ inch	1 75
1 to 2½ inch	1 95
2⅝ to 3¼ inch	2 25
3⅛ to 4 inch	2 75
4⅛ to 4¾ inch	3 25
4⅞ to 5 inch	3 45

Ova

½ to 1¼ inch	2 15
⅝ to ¾ inch	2 25
⅝	2 55
¼	2 95

Half Oval and Half Round.

⅜ to 3 inch	2 85
⅜ to 1¼ inch	2 45
⅜ to ¾ inch	3 05
½	3 25
⅝	4 75

Heavy Band.

⅛ to 6 by ¼ and 5-16 inch	1 55
⅛ to 1¼ by ¼ and 5-16 inch	2 05
⅜ to ⅝ by ¼ and 5-16 inch	2 25
⅜ to ⅝ by ½ and 5-16 inch	3 75

Hoops.

1¼ to 4, Nos. 13 to 15	2 55
1¼ to 2, Nos. 16 to 18	2 65
1¼ to 2, No. 19	2 75
1¼ to 2, No. 20	2 85
1¼ to 2, No. 21	2 95
1¼ to 2, No. 22	3 05
15-16, 1 and 1⅛, Nos. 13 to 15	2 75
15-16, 1 and 1⅛, Nos. 16 to 18	2 85
15-16, 1 and 1⅛, Nos. 19 and 20	2 95
15-16, 1 and 1⅛, No. 21	3 05
15-16, 1 and 1⅛, No. 22	3 15
⅞, Nos. 13 to 15	2 95
⅞, Nos. 16 to 18	3 05
⅞, Nos. 19 and 20	3 15
⅞, No. 21	3 25
⅞, No. 22	3 35
13-16, Nos. 13 to 15	3 15
13-16, Nos. 16 to 18	3 25
13-16, Nos. 19 and 20	3 35
13-16, No. 21	3 45
13-16, No. 22	3 55
¾, Nos. 13 to 15	3 25
¾, Nos. 16 to 18	3 45
¾, Nos. 19 and 20	3 55
¾, No. 21	3 65
¾, No. 22	3 75
11-16, Nos. 13 to 15	3 55
11-16, Nos. 16 to 18	3 65
11-16, Nos. 19 and 20	3 75
11-16, No. 21	3 85
11-16, No. 22	3 95
⅝, Nos. 13 to 15	3 75
⅝, Nos. 16 to 18	3 95
⅝, Nos. 19 and 20	4 05
⅝, No. 21	4 15
⅝, No. 22	4 25
⅝, No. 23	4 45

Light Band.

1¼ to 6 by ⅛ to 3-16 in	2 20
1¼ to 6 by Nos. 11 and 12	2 30
1 to 1¾ by ⅛ to 3-16 in	2 40
1 to 1¾ by Nos. 11 and 12	2 50
⅜ and 13-16 by ⅛ to 3-16 in	2 70
⅜ and 13-16 by Nos. 11 and 12	2 80
½ and 11-16 by ⅛ to 3-16 in	3 00
½ and 11-16 by Nos. 11 and 12	3 10
⅝ and 9-16 by ⅛ to 3-16 in	3 30
⅝ and 9-16 by Nos. 11 and 12	3 40
¾ by ⅛ to 3-16 in	3 60
¾ by Nos. 11 and 12	3 70

Wagon Box Iron.

¼ inch, beveled edge, by Nos. 11 and 12	2 80
¼ inch, " " " 13 and 14	3 00
¼ inch, " " " 11 and 12	3 10
¼ inch, " " " 13 and 14	3 30

Sheet Iron.

No. 10 to 14	2 45
No. 15 to 17	2 55
No. 18 to 21	2 75
No. 22 to 24	2 85
No. 25 to 26	2 95
No. 27	3 25
No. 28	3 50

Iron Boiler Plates.

Tank, ¼ inch and heavier	2 25
C No. 1, " "	2 40
C H No. 1 " "	2 50
C H Flange, " "	3 50
Extra Flange, "	4 00
Solid Fire Box "	4 75

Steel Boiler Plates—1-4 in. and Heavier.

Tank	2 25
Shell	2 50
Flange	2 75
Marine Flange	3 00
Fire Box	4 00

Above includes plates 90 inches wide.

90 to 96 in. wide	¼c ℔ extra
96 to 100 in. wide	1 c "
100 to 104 in. wide	1¼c "
104 to 116 in. wide	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. ℔s
1 to 2 in. inclusive	08
9-16 to ⅞ in "	08½
7-16 to ⅞ and 2¾ to 3 in	09
3⅛ to 4 in	09½
⅛ to 11-16 and 4¼	10
⅛ to 6 in	0¼
¼ to 9-32 and 6⅛ to 7 in	11
3-6 in	3

Flats.

	cts. ℔s
2 to 9-16 wide by 2 to ⅛ thick	8

Bessemer and O. H. Steel.

Machinery	base price,	2 35
Tire	"	2 25
Spring	"	2 80
Sleigh Shoe	"	2 50
Toe Calk	"	2 35
Cutter Shoes, tapered and burr.	"	2 75

English Tool Steel.

Jessop's	15½c
Hobson's "Best"	15½c
" "Choice"	15?

Burden Boiler Rivets.

⅛, ¾, 11-16 and ¼ inches diameter	4 00
Bridge ⅛, ¾, 11-16 and ¼ inch diam	4 00

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	NET TONS
No. 1 R. R. wrought scrap	$18 00
No. 1 wrought scrap	16 50
No. 1 Machine cast scrap	11 50
Iron axles	23 50
Axle turnings	13 50
Wrought turning (free from cast)	11 50
Cast borings	8 00
Uncut wrought iron boilers	11 50
Steel boiler plates	16 00
Grate Bars	8 00
Pipes and flues (Clean)	12 00
Tank iron	12 50
Hoop and band iron	9 50
Sheet iron	8 50
Wrought drillings	11 00
Malleable iron	9 50

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Railroad Wrought	$20 00
No. 1 Country Wrought	17 00
Stove Plate	8 75
Machine Castings	11 00
Hoop and Sheet	8 00
Casting Borings	9 00
Wrought Turnings	12 00

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Wrights.....₩ lb 12

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Blacksmiths' { Hill's.....dis 40 / Bullock's.....dis 50&10
Moulders'.....dis 40@40&10
Hand.....dis 40&10@50

Belting.

Boston Belting Co's standard.....dis 70
" " " extra.....dis 60&5
" " " best.....dis 55
Hoyt's Short Lap.....dis 45
Cleveland Rubber Co. extra standard..dis 60&10
Shults Raw Hide Leather Belting, single.....dis 40
Shults Raw Hide Leather Belting, double and Light Double.....dis 40
Standard, oak tanned.....dis 50&10
Alexander Brothers' pure oak tanned. ...dis 45

Blowers and Exhausters.

B. F. Sturtevant's.....dis 20
Boston Blower Co.....dis 35
Buffalo.....dis 35

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.....₩ lb 12

Chalk.

White.....₩ gross 50
White Crayon.....₩ gross 12@12½ dis 10
Red.....dis 70
Blue.....dis 85

Chucks.

Cushman's 4 Jaw Independent.....dis 45
" Combination.....dis 40
" Geared Scroll.....dis 30
" 2 Jaw Brass Workers.....dis 30
" Drill.....dis 35
Wescott's Scroll Combination.....dis 33⅓
" Independent.....dis 40
" Little Giant Drill.....dis 30
Horton's Universal.....dis 40
" Independent.....dis 45
Whiton's Independent.....dis 45
National Combination.....dis 40
Sweetland " .....dis 40
Almond Drill.....dis 20
Morse " .....dis 15
Skinner's Combination Lathe.....dis 33⅓
" Independent Lathe.....dis 40
" Universal Lathe.....dis 40
" Drill.....dis 15

Cutters and Reamers.

Cleveland.....dis 10@15
Pratt & Whitney.....dis 10@15
Standard.....dis 10@15
Brown & Sharpe, Milling Cutters.....dis 15
Gear Cutters.....dis 15

Crowbars.

Cast Steel.....₩ lb 4
Iron, steel points.....₩ lb 3½

Drill and Drill Sockets.

Twist drills.....dis 50&10
Morse Taper and Straight shank to 1¾".....dis 50&10
Morse Taper and Straight shank Larger than 1¾".....dis 25
Drill Sockets.....dis 25
Standard Twist Drills.....dis 55@55&5
Cleveland " " .....dis 55@55&5

Emery.

	No. 4 to 46 gr.	No. 54 to 150. gr.	Flour, F.	C. F. FF.
Kegs, ₩ lb	4 c	5 c		2½c
½ kegs ₩ lb	4½c	5½c		2½c
¼ kegs ₩ lb	4½c	5½c		3 c
6 lb cans, 10 in case	6 c	6½c		5 c
6 lb cans, less than 1	10 c	10 c		7½c

Emery Cloth and Paper.

Barder, Adamson & Co.....dis 45@50
H. H. Barton.....dis 50@50&10

Emery Wheels.

Detroit.....dis 55@60
Norton's.....dis 55@60
Grant.....dis 55@60
Sterling.....dis 60
Celluloid.....dis 10&33⅓
Northampton.....dis 55
Crystal.....dis 65@70
Vitrified.....dis 60
Vulcanite.....dis 10&10

Files.

Nicholson.....dis 60&10@60&10&10
" X. F.....dis 25
Kearney & Foot.....dis 60&10@60&10&10
Black Diamond.....dis 60&10@60&10&10
Arcade.....dis 60&10@60&10&10
Disston's.....dis 65@70
Western.....dis 70
Stub's.....dis 25
Grobet's.....dis 30
Reynolds Bros.' Hand Cut.....dis 50
ndustry File Works, hand cut.....dis 50

Hammers.

P. S. W.....dis 40
Atha new list, Jan. 15, 1887.....dis 50
Heavy hammers and sledges under 5 lbs. 18c over 5 lbs 14c, new list.

Jack Screws.

Illinois Bolt Co. list.....dis 70

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5¾	4½	4	2¾	2¼
Hexagon	15¾	11¾	8½	6	5¼	5¼	5
Washers	9	8	7	5	4½	4½	4¼

In lots less than 100 lbs, ₩ lb add ¼c., 1lb boxes add 1c to list.

Nails (wire.

List July 14, 1887.....dis 70 &10
Standard Penny Nails, ₩ keg card rate
{ Car lots.....$2.30
{ Less than car lots$2.40

Oilers.

Zinc and Tin.....dis 60
Brass and Copper.....dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz.....dis 10@10&10

Packing, Steam.

Boston Belting Co.....dis 60
American Packing Hemp.....₩ lb 10@11
Russia Packing " .....₩ lb 14
Italian Packing " .....₩ lb 13@14
Plumbago Piston.....₩ lb 40
Morrison's " .....₩ lb 50
Square Flax " .....₩ lb 50
Sheet Rubber.....₩ lb 12&24
Excelsior Rubber.....₩ lb 48

Picks.

Railroads, 5 to 6 lbs.....$12 dis 60
" 6 to 7 lbs.....$13 dis 60

Pulleys.

Iron Pulleys, Walker List.....dis 45
Medart Pulleys.....dis 55
Split Wood Pulleys.....dis 50@55

Rivets.

Iron, Thousand, list November 17, ...dis 50
Iron, Ordinary, Cooper's Block and Carriage list November 17.....dis 50
Copper.....dis 50@50&10

Rope.

Manilla, ½ inch and over.....₩ lb 15¾
Sisal, ½ inch and over .....₩ lb 13¾

Sand Paper.

B. A. & Co.....dis45@50
H. H. Barton's.....dis40@45
New England Flint.....dis 40@50
Barton's Garnet.....dis 20

Saws.

Disston's Circular.....dis 40@10
" Band.....dis 20
" Scroll .....Net
Hack Saw Stubs.....dis 20
" " Eureka.....dis 20
" " Star.....dis 20
Saw Swages Disston's.....dis 30
Atkins' Cicular Saws.....dis 40&45
" Mill, Mulay and Drag Saws..dis 40&10
" Wood Saws.....dis 40&10
" Silver Steel Diamond Cross-cut Saws.....dis 70c per ft
" Dexter Cross-cuts.....dis 50c "
" Diamond " .....dis 30c "
" Tuttle Tooth Cross-cuts..dis 25c "
" One-man Cross-cuts.....dis 33c "
No. 1 Handles.....dis 25c per pair
No. 6 " .....dis 16c "
Excelsior Saw Tools.....$6 per doz
Perfection " .....$15 "
Detroit Saw Works, Circular.....dis 50
" " " Band.....dis 25
" " " Mulay .....dis 45

Screws.

Wood Screws—New List 1890.

Flat head iron.....dis 72½
Round head iron.....dis 67½
Flat head brass.....dis 72½
Round head brass.....dis 65
Square Cap.....dis 65
Hexagon Cap.....dis 60
Set C. H. C. P.....dis 70
Machine, flat head, iron.....dis 65
Machine, round head, iron.....dis 60
Bench and hand—
Lag or coach.....dis 75@75&10
Coach, patent gimlet point.....dis 75

Shovels and Spades.

Ames' list November 1, 1885.....dis 20
Dennis.....dis 5.25
Hussey & Binns, railroad.....dis 8.00

Taps.

Cards, Hand and Nut to 2 in.....dis 50
Carpenters' " " " .....dis 50
Morse " " " .....dis 50
Pratt & Whitney " " new list dis 10
Machine Screw Taps.....dis 55
Pipe Taps to 2½ in.....dis 70
Stay Bolt Taps.....dis 25
Stove Bolt Taps.....dis 50
Pulley Taps.....dis 40

Twine.

	BC.	B.
No. 12, Flax Twine, ¼ and ⅛ lb Balls		21c@29c
No. 18 " " ¼ and ⅛ "		18c@28c
No. 36 " " ¼ and ⅛ "		16c@27c
2-Ply Hemp, ¼ & ⅛ lb Balls (Spring Twine		11½c
3-Ply " 1lb Balls		12@12½c
3-Ply " 1½ lb Balls		11@11½c
Cotton Wrapping, 5 Balls to lb		15@16c

Vises.

Solid Box.....dis 60
Parker's.....dis 20@25
Prentiss.....dis 20
Stephen's.....dis 25@30
Barrett's.....dis 30
Miller's Falls.....dis 40
Merrill's.....dis 15@20
Howard.....dis 25

Wire.

New List, Jan. 18, 1884

Brass and copper.....dis 20@25
Bright and annealed, Nos. 0@18...dis 70&10@75
" " Nos. 19@26..dis 75@75& 5
" " Nos. 27@36..dis 75&10& 5
Coppered Nos. 0 to 18, market list..dis 70@70& 5
Galvanized Nos. 0 to 18 " ".....dis 65&5
Tinned market Nos. 0 to 18.....dis 67½
Cast steel.....dis 50
Tinned Broom Wire.....dis 70&5@70&10
Annealed Fence, Nos. 8 and 9.....dis 75
Annealed Grape, Nos. 10 to 14.....dis 75
Stub's Steel Wire, regular.....$6.00 lb dis 5

Wrenches.

Coe's genuine, ...dis 50
Girard Standard.....dis 70&10
Agricultural.....dis 75&10
Mechanics'.....dis 55&10, & 5
Bemis & Call's Combination .....dis 35
Donohue's Engineers.....dis 20&10
Lamson & Sessions Engineers.....dis 60
Billings & Spencer's Drop Forged.....dis
William's " " .....dis
Alligator " " .....dis

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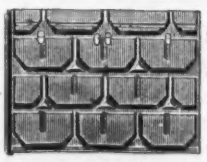
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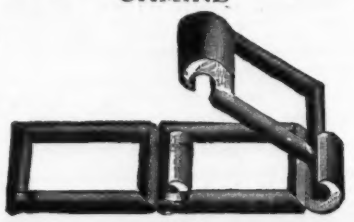
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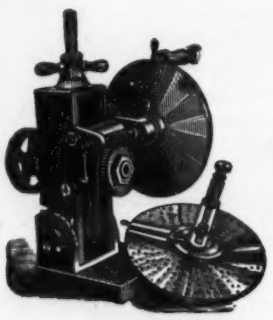
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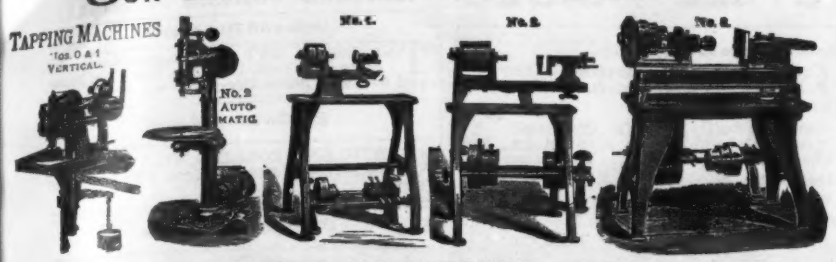

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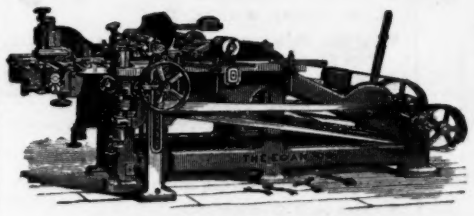

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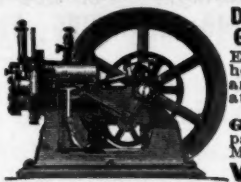

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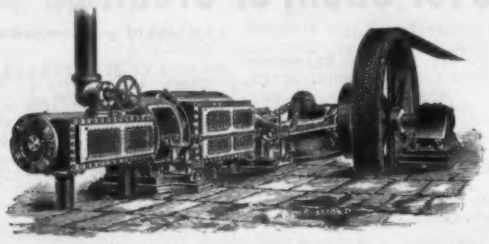

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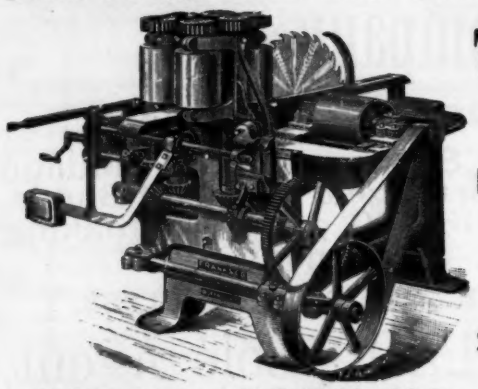

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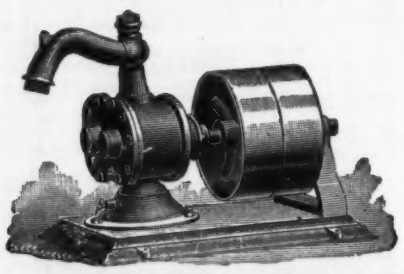

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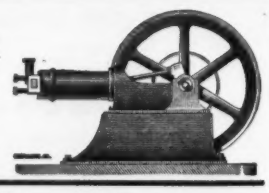

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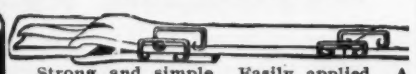

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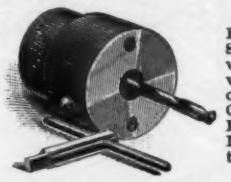

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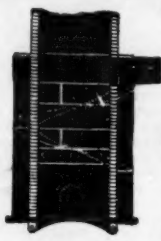

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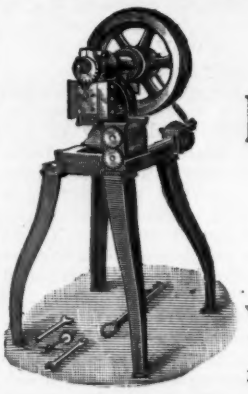

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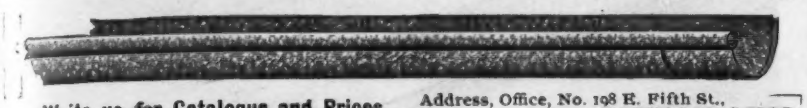

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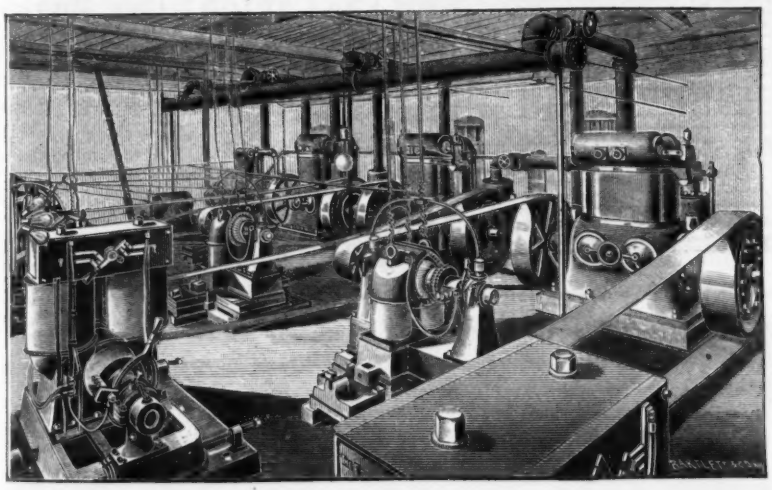

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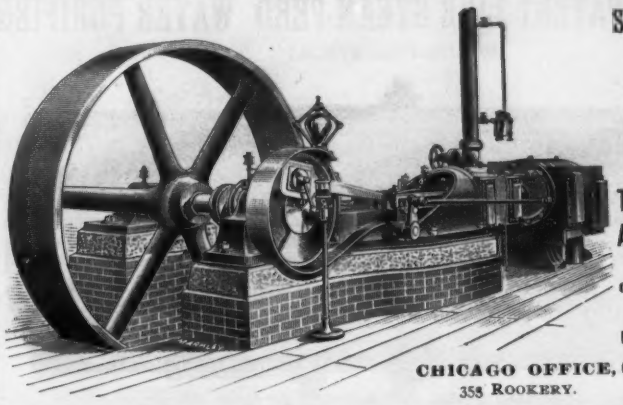

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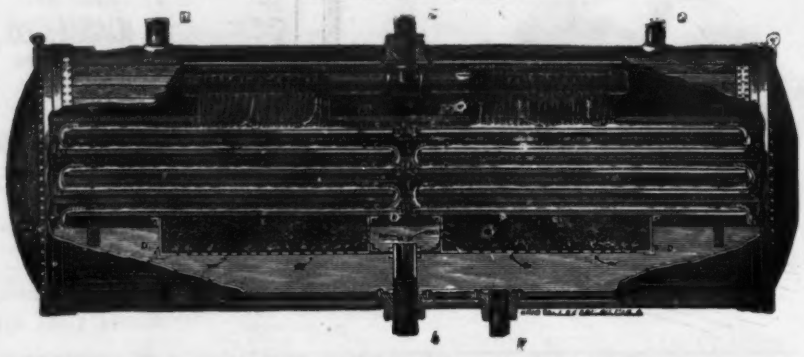

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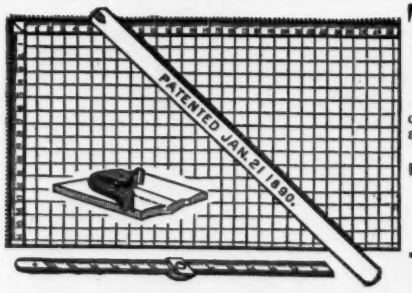

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